NASA TECHNICAL MEMORANDUM

NASA TM X-64705

A COSMIC X-RAY ASTRONOMY BIBLIOGRAPHY: THE ASTROPHYSICAL JOURNAL, 1962 to 1972

By Robert M. Wilson Space Sciences Laboratory

April 1972

CASE FILE COPY

NASA

George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama

	120	MICHE REPORT STANDARD THEE PAGE
1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
TM X-64705 4. TITLE AND SUBTITLE	 	5. REPORT DATE
A Cosmic X-Ray Astronomy Bibliography: The Astrophysical		April 1972
Journal, 1962 to 1972		6. PERFORMING ORGANIZATION CODE
7. AUTHOP (S)		B. PERFORMING ORGANIZATION REPORT
Robert M. Wilson		
9. PERFORMING ORGANIZATION NAME AND	ADDRESS	10. WORK UNIT NO.
George C. Marshall Space Fligh	ht Center	11. CONTRACT OR GRANT NO.
Marshall Space Flight Center, A	Alabama 35812	13. TYPE OF REPORT & PERIOD COVERED
12. SPONSORING AGENCY HAME AND ADDR	ESS	13. THE OF REPORT & PERIOD COVERED
 National Aeronautics and Space	Administration	Technical Memorandum
Washington, D.C. 20546		14. SPONSORING AGENCY CODE
		14. SPUNSORING AGENCY CODE
15. SUPPLEMENTARY NOTES		
Prepared by Space Sciences Lak	boratory, Science and Enginee	ring
16. 4ESTRACT		
	7. 6. 6.1.	
		crophysical Journal for the time
period January 1962 through Ma tained within this document rela		
damed within this document rela	tied to cosmic X-ray astronom	.y•
• •	·	
		1 - December 1
		t
·	•	
	•	
,		
17. FFY WORDS	10 DISTRIBU	TION STATEMENT
17, 121 4000	io. Distribu	
	4	
	Unclas	sified - unlimited
1	Ma	TM.Wisa
19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this pe	ge) 21. NO. OF PAGES 22. PRICE
Unclassified	Unclassified	115 NTIS
Chombonia.		

TABLE OF CONTENTS

	Pag
SUMMARY	1
INTRODUCTION	2
PART I AUTHOR-TITLE BIBLIOGRAPHY	5
PART II AUTHOR INDEX TO PART I	39
PART III SUBJECT INDEX TO PART I	61
APPENDIX A VOLUME-PAGE BIBLIOGRAPHY	79

TECHNICAL MEMORANDUM X-64705

A COSMIC X-RAY ASTRONOMY BIBLIOGRAPHY: THE ASTROPHYSICAL

JOURNAL, 1962 to 1972

The second of the second second second second

WORLD SUMMARY: A WOLD FOR ENVIOLENCE THE COLUMN SERVICE

This report presents the results of a survey of the Astrophysical Journal for the time period January 1962 through March 1972 (volumes 135-172). Some 395 references are contained within this document related to cosmic X-ray astronomy.

TO A SATELLA

Control of the Contro

The style of this report is that of the bibliography. That is, the main body is divided into three sections: (1) Part I — Author - Title Bibliography; (2) Part II — Author Index to Part I; and (3) Part III — Subject Index to Part I. Also included as Appendix A — Volume - Page Bibliography is a convenient listing of articles by volume-page (or by year).

It is to be emphasized that this document is a strict bibliography, thus, yielding only bibliographic information. It is <u>not</u> annotated as in previous bibliography summaries by the author [1, 2]. Also, it should be stressed that this work represents only one scientific journal — The Astrophysical Journal — and for only the time period since 1962, the inception year for the study of cosmic X rays. Similar reports for the same time frame for other journals are envisioned.

Wilson, R. M.; Reynolds, J. M., and Fields, S. A.: A Stellar X-Ray Astronomy Summary and Bibliography. NASA TM X-53952, October 21, 1969.

Wilson, R. M.; Reynolds, J. M., and Fields, S. A.: A Solar X-Ray Astonomy Summary and Bibliography. NASA TM X-53991, January 1970.

INTRODUCTION

The detection and study of cosmic X rays is a most recent phenomenon. It was just ten years ago when the pioneer studies of Drs. Giacconi, Gursky, Paolini, and Rossi [3] were first performed to detect the existence of cosmic X rays, X rays originating from outside the solar system.

Over the years many studies and experiments have been performed. The X-ray observations were chiefly carried out by rockets and balloons. The ground-based optical and radio observations were attempted to correlate X-ray emission regions with known visual or radio components. The results of these studies have shown the existence of a large number of X-ray-emitting regions, some stellar in origin, resolved against a diffuse, nearly isotropic background. The list of X-ray objects now numbers more than one hundred, owing chiefly to the use of satellite observation and improved observing and positioning techniques. Some of the X-ray emitters are indeed identifiable with known visual and radio components. For example, Taurus X-1 is identifiable with the Crab Nebula (M1), a supernova remnant (SN 1054) in the constellation Taurus that contains a pulsar (NP 0532) at its center; Scorpius X-1 is a 12th to 13th magnitude blue, star-like object in the constellation Scorpius; and Virgo X-1 is the radio galaxy M87 in Virgo. Other X-ray objects have been correlated with Seyfert galaxies (NGC 1275), QSO's (3C 273), and normal galaxies (LMC); also, one object (Cen X-3) exhibits a light curve similar to that of an eclipsing binary star.

³Giacconi, R.; Gursky, H.; Paolini, F. and Rossi, B.: Evidence for X-Rays from Sources Outside the Solar System. Phys. Rev., Vol. 9, 1962, pp. 439-443.

Because cosmic X-ray astronomy is a relatively new discipline, its rate of growth — that is, the total number of papers related to cosmic X-ray astronomy — has been rather substantial. Of the 395 references included within this bibliographic text, 126 are dated since 1970; 251 are dated since 1968. Because cosmic X-ray astronomy has evolved rather rapidly and because of its importance in astrophysical and astronomical analysis and interpretation, a comprehensive bibliography of all the articles published in the scientific journals related to cosmic X-ray astronomy should be available. With this purpose in mind, this report represents a beginning.

The author recently completed a survey of the Astrophysical Journal for the time period January 1962 through March 1972 (volumes 135-172) for the purpose of determining all articles related to cosmic X-ray astronomy.

Thus, included in this compilation are all articles and items which contain some reference to cosmic X-ray observation or theory, whether or not the main purpose of the article concerned X-ray observations. Three hundred and ninety-five references were determined and are included in this bibliography.

The style of this report is like that of most bibliographies—that is, it is divided into three main sections. Part I — Author-Title Bibliography lists the references alphabetically by the authors' names and the title of the article or item. Part II — Author Index to Part I identifies all the authors listed in Part I and their works. It also is in alphabetical order by author's name. Part III — Subject Index to Part I provides the reader with an

outline of topics that are discussed in the articles listed in Part I. In Parts II and III the numbers appearing after the author's name or after the subject topic refer to the numerical listing in Part I. For example, "O'Dell, C. R. - 281" refers the reader to reference number 281 in Part I. The reader would find the reference "281. O'Dell, C. R.: Positional Correlations of Galactic Objects and X-Ray Sources. Vol. 147, 1967, pp. 855-857." Similarly, in the subject index "Epsilon Aurigae - 387" refers the reader to reference number 387 in Part I. The reader would then find reference "387. Wilson, R. E.: A Model of Epsilon Aurigae. Vol. 170, 1971, pp. 529-539."

A fourth section is also included in this report. Appendix A—

Volume-Page Bibliography is a convenient listing of all the articles and

items referenced in Part I by volume-page (or by year). In this section

it is quite simple to determine the total number of papers related to cosmic

X-ray astronomy published each year for this particular journal.

It is emphasized that this bibliography concerns itself with only one journal — the Astrophysical Journal — for a certain period of time, 1962 to 1972, and on a particular topic, cosmic X-ray related papers. It is a "strict" bibliography, not of the annotated style.

In conclusion, the author again states that this bibliography is only a beginning toward the desired goal of obtaining a truly comprehensive listing of cosmic X-ray related papers of the major scientific journals.

Similar reports are, therefore, envisioned.

PART I

AUTHOR-TITLE RIRETOCRAPHY

market their plantal abstracts come

Page Intentionally Left Blank

- 1. Ables, J. G.: Possible Time Variation of the Radio Emission from Sco X-1. Vol. 155, 1969, pp. L27-L30.
- Acton, L. W.; Catura, R. C.; Culhane, J. L. and Fisher, P.C.: X-Ray Line Emission from Scorpius X-1. Vol. 161, 1970, pp. L175-L179.
- 3. Allen, R. J.: The Absorption of Non-Thermal Radio Radiation in Thermal X-Ray Sources. Vol. 153, 1968, pp. 389-396.
- 4. Andrew, B. H. and Kraus, J. D.: Radio Sources with Flat Spectra. Vol. 159, 1970, pp. L45-L49.
- Andrew, B. H.; Purton, C. R.; Rappaport, S.; Bradt, H. and Schnopper, H. W.: A Search for Radio Emission from Four X-Ray Sources Near Sagittarius. Vol. 161, 1970, pp. L173-L174.
- 6. Angel, J. R. P.: Polarization of Thermal X-Ray Sources. Vol. 158, 1969, pp. 219-224.
- 7. Angel, J. R. P.; Kestenbaum, H. and Novick, R.: Evidence of High-Frequency Oscillations in the X-Ray Flux from Scorpius X-1. Vol. 169, 1971, pp. L57-L61.
- 8. Arons, J.: Low-Mass Protogalaxies and Absorption Lines in Quasi-Stellar Objects. Vol. 172, 1972, pp. 553-562.
- 9. Arons, J.: Radiative Transfer of Isotropic X-Rays and Gamma Rays. I. General Theory and Solutions for a Uniform Medium. Vol. 164, 1971, pp. 437-455.
- 10. Arons, J.: Radiative Transfer of Isotropic X-Rays and Gamma Rays. II. High Energy Radiation in the Expanding Universe. Vol. 164, 1971, pp. 457-468.
- 11. Arons, J. and McCray, R.: Interaction of Cosmic Gamma Rays with Intergalactic Matter. Vol. 158, 1969, pp. L91-L95.
- 12. Arons, J.; McCray, R. and Silk, J.: Interaction of Fast Particles with Intergalactic Matter. Vol. 170, 1971, pp. 431-447.
- 13. Bahcall, J. N.; Kozlovsky, B. and Salpeter, E. E.: On the Time Dependence of Emission-Line Strengths from a Photoionized Nebula. Vol. 171, 1972, pp. 467-482.

Market The Security of the Section

- 14. Bahcall, J. N.; Rees, M. J. and Salpeter, E. E.: Extragalactic Pulsars. Vol. 162, 1970, pp. 737-742.
 - 15. Bahcall, J. N. and Wolf, R. A.: An Observational Test of Theories of Neutron-Star Cooling. Vol. 142, 1965, pp. 1254-1256.
 - 16. Baxter, A. J.; Wilson, B. G. and Green, D. W.: The Diffuse X-Radiation Spectrum Below 4 keV. Vol. 155, 1969, pp. L145-L148.
 - 17. Becklin, E. E.; Frogel, J. A.; Kleinmann, D. E.; Neugebauer, G.; Ney, E. P. and Strecker, D. W.: Infrared Observations of the Core of Centaurus A, NGC 5128. Vol. 170, 1971, pp. L15-L19.
 - 18. Becklin, E. E. and Kleinmann, E.D. E.: Infrared Observations of the Crab Nebula. Vol. 152, 1968, pp. L25-L30.
 - 19. Belian, R. D.; Conner, J. P. and Evans, W. D.: A Probable Precursor to the X-Ray Nova Centaurus XR-4. Vol. 171, 1972, pp. L87-L90.
 - 20. Bingham, R. G. and Clark, C. D.: High-Energy X-Rays from Cygnus XR-1. Vol. 158, 1969, pp. 207-218.
 - 21. Blanco, V.; Kunkel, W. and Hiltner, W. A.: Spectrum of an Ultraviolet Object in Sagittarius. Vol. 152, 1968, p. L137.
 - 22. Blanco, V.; Kunkel, W.; Hiltner, W. A.; Chodil, G.; Mark, H; Rodrigues, R.; Seward, F. and Swift, C. D.: Spectrum of the Central Star in NGC 5189. Vol. 152, 1968, pp. L135-L136.
 - 23. Blanco, V.; Kunkel, W.; Hiltner, W. A.; Lynga, G.; Bradt, H.; Clark, G.; Naranan, S.; Rappaport, S. and Spada, G.: An Optical Search for X-Ray Sources in Sagittarius. Vol. 152, 1968, pp. 1015-1017.
 - 24. Bleach, R. D.; Boldt, E. A.; Holt, S. S.; Schwartz, D. A. and Serlemitsos, P. J.: X-Ray Spectra of Discrete Sources in Cygnus. Vol. 171, 1972, pp. 51-54.
 - 25. Bleeker, J. A. M.; Burger, J. J.; Deerenberg, A. J. M.; Scheepmaker, A.; Swanenburg, B. N. and Tanaka, Y.: Balloon Observation of the X-Ray Sources in the Cygnus Region in the Energy Range 20-130 keV. Vol. 147, 1967, pp. 391-394.

- Bleeker, J. A. M. and Deerenberg, A. J. M.: The Diffuse Cosmic X-Ray Background from 20 to 220 keV. Vol. 159, 1970, pp. 215-228.
- 27. Bless, R. C.; Fischel, D. and Stecher, T. P.: Of and Wolf-Rayet Stars as X-Ray Sources. Vol. 151, 1968, pp. L117-L119.
- 28. Blumenthal, G. R.; Drake, G. W. F. and Tucker, W. H.:
 Ratio of Line Intensities in Helium-Like Ions as a
 Density Indicator. Vol. 172, 1972, pp. 205-212.
- 29. Boldt, E. A.; Desai, U. D. and Holt, S. S.: 2-20 keV Spectrum of X-Rays from the Crab Nebula and the Diffuse Background Near Galactic Anticenter. Vol. 156, 1969, pp. 427-436.
- 30. Boldt, E. A.; Desai, U. D.; Holt, S. S. and Serlemitsos, P. J.: A Limit on Line Emission in the X-Ray Background at High Galactic Latitudes. Vol. 167, 1971, pp. L1-L2.
- 31. Boldt, E. A.; Holt, S. S. and Serlemitsos, P. J.: Search for Temporal Structure in X-Rays from Scorpius X-1. Vol. 164, 1971, pp. L9-L13.
- Boldt, E. and Serlemitsos, P.: Cosmic X-Ray Bremsstrahlung Associated with Suprathermal Protons. Vol. 157, 1969, pp. 557-562.
- 33. Boldt, E. and Serlemitsos, P.: Erratum: "Cosmic X-Ray Bremsstrahlung Associated with Suprathermal Protons." Vol. 161, 1970, p. 375.
- 34. Bowyer, S.: An Alternate Interpretation of the Paper "Stellar X-Ray Emission," by P. C. Fisher and A. J. Meyerott. Vol. 140, 1964, pp. 820-821.
- 35. Bowyer, C. S.; Lampton, M.; Mack, J. and De Mendonca, F.:
 Detection of X-Ray Emission from 3C 273 and NGC 5128.
 Vol. 161, 1970, pp. L1-L7.
- 36. Bradt, H.; Mayer, W.; Naranan, S.; Rappaport, S. and Spada, G.: Evidence for X-Radiation from the Radio Galaxy M87. Vol. 150, 1967, pp. L199-L206.
- 37. Bradt, H.; Naranan, S.; Rappaport, S. and Spada, G.: Celestial Positions of X-Ray Sources in Sagittarius. Vol. 152, 1968, pp. 1005-1013.

- 38. Brandt, J. C. and Roosen, R. G.: Messier 87: The Galaxy of Greatest Known Mass. Vol. 156, 1969, pp. L59-L61.
- 39. Brecher, K. and Morrison, P.: Cosmology, Black-Body Radiation, and the Diffuse X-Ray Background. Vol. 150, 1967, pp. L61-L64.
- 40. Brecher, K. and Silk, J.: Lemaître Universe, Galaxy Formation and Observations. Vol. 158, 1969, pp. 91-102.
- 41. Brini, D.; Ciriegi, U.; Fuligni, F.; Moretti, E. and Vespignani, G.: Cosmic X-Ray Sources in the 20-180 keV Energy Range. Vol. 149, 1967, pp. 429-433.
- 42. Brown, R. L.: On the Photoionization of Hydrogen and Helium. Vol. 164, 1971, pp. 387-388.
- 43. Brown, R. L.: Production of the Diffuse Background X-Ray Flux at 44 A by Suprathermal Proton Bremsstrahlung. Vol. 159, 1970, pp. L187-L192.
- 44. Bunner, A. N.; Coleman, P. L.; Kraushaar, W. L. and McCammon, D.: Low-Energy Diffuse X-Rays. Vol. 167, 1971, pp. L3-L8.
- 45. Bunner, A. N.; Coleman, P. L.; Kraushaar, W. L. and McCammon, D.: Soft X-Rays from the Vicinity of the North Polar Spur. Vol. 172, 1972, pp. L67-L72.
- 46. Bunner, A. N. and Palmieri, T. M.: A New X-Ray Source in the Constellation Ara. Vol. 158, 1969, pp. L35-L36.
- 47. Burbidge, E. M.; Lynds, C. R. and Stockton, A. N.: On the Binary Nature of Cyg X-2. Vol. 150, 1967, pp. L95-L97.
- 48. Burbidge, G. R.: Compact Nonthermal Sources in M87. Vol. 159, 1970, pp. L105-L108.
- 49. Burginyon, G. A.; Grader, R. J.; Hill, R. W.; Price, R. E.;
 Rodrigues, R.; Seward, F. D.; Swift, C. D.; Hiltner, W. A.
 and Mannery, E. J.: Scorpius XR-1: Some X-Ray and
 Optical Observations (1969 May). Vol. 161, 1970,
 pp. 987-995.
- 50. Cathey, L. R. and Hayes, J. E.: Interstellar Reddening in the Field of Cyg X-2. Vol. 151, 1968, pp. L89-L92.
- 51. Cavaliere, A.; Morrison, P. and Pacini, F.: A Model for the Radiations from the Compact Strong Sources. Vol. 162, 1970, pp. L133-L138.

- 52. Cavaliere, A.; Morrison, P. and Wood, K.: On Quasar Evolution. Vol. 170, 1971, pp. 223-231.
- 53. Cavaliere, A. and Pacini, F.: Supernova Remnants and Hidden Pulsars. Vol. 159, 1970, pp. L21-L24.
- 54. Chaisson, E. J. and Goad, L. E.: Low-Energy X-Rays Ruled
 Out as Interstellar Ionizing Mechanism Toward K3-50.
 Vol. 171, 1972, pp. L61-L65.
- 55. Chiu, H. Y. and Canuto, V.: Theory of Radiation Mechanisms of Pulsars. I. Vol. 163, 1971, pp. 577-594.
- 56. Chodil, G.; Mark, H.; Rodrigues, R.; Seward, F. D. and Swift, C. D.: X-Ray Intensities and Spectra from Several Cosmic Sources. Vol. 150, 1967, pp. 57-65.
- 57. Chodil, G.; Mark, H.; Rodrigues, R.; Seward, F. D.; Swift, C. D.; Turiel, I.; Hiltner, W. A.; Wallerstein, G. and Mannery, E. J.: Simultaneous Observations of the Optical and X-Ray Spectra of Sco XR-1. Vol. 154, 1968, pp. 645-654.
- 58. Chodil, G.; Mark, H.; Rodrigues, R. and Swift, C. D.:
 Nova-Like Behavior of the X-Ray Source Centaurus XR-2.
 Vol. 152, 1968, pp. L45-L48.
- 59. Chodil, G.; Mark, H.; Rodrigues, R. and Swift, C. D.:
 Observation of the Cygnus Region with a Balloon-Borne
 X-Ray Detector. Vol. 151, 1968, pp. L1-L3.
- 60. Clark, G. W.; Garmire, G. P. and Kraushaar, W. L.: Observation of High-Energy Cosmic Gamma Rays. Vol. 153, 1968, pp. L203-L207.
- 61. Clark, G. W.; Lewin, W. H. G. and Smith, W. B.: Sky Survey of High-Energy Cosmic X-Rays and Spectra of the Sources in the Crab Nebula and Cygnus. Vol. 151, 1968, pp. 21-32.
- 62. Clayton, D. D.; Colgate, S. A. and Fishman, G. J.: Gamma-Ray Lines from Young Supernova Remnants. Vol. 155, 1969, pp. 75-82.
- 63. Clayton, D. D. and Craddock, W. L.: Radioactivity in Supernova Remnants. Vol. 142, 1965, pp. 189-200.

- 64. Clayton, D. D. and Silk, J.: Measuring the Rate of Nucleosynthesis with a Gamma-Ray Detector. Vol. 158, 1969, pp. L43-L48.
- 65. Coleman, P. L.; Bunner, A. N.; Kraushaar, W. L. and McCammon, D.: X-Ray Observation of a New Soft Source in Cygnus. Vol. 170, 1971, pp. L47-L49.
- 66. Conner, J. P.; Evans, W. D. and Belian, R. D.: The Recent Appearance of a New X-Ray Source in the Southern Sky. Vol. 157, 1969, pp. L157-L159.
- 67. Cooke, B. A.; Pounds, K. A.; Stewardson, E. A. and Adams, D. J.: A Cosmic X-Ray Survey in the Southern Hemisphere. Vol. 150, 1967, pp. L189-L191.
- 68. Coppi, B. and Ferrari, A.: Collective Modes of Plasma Surrounding a Collapsed Star. Vol. 161, 1970, pp. L65-L69.
- 69. Coppi, B. and Treeves, A.: Plasma Model for Thermal X-Ray Sources. Vol. 167, 1971, pp. L9-L13.
- 70. Cox, D. P. and Daltabuit, E.: Radiative Cooling of a Low-Density Plasma. Vol. 167, 1971, pp. 113-117.
- 71. Cunningham, C.; Groves, D.; Price, R.; Rodrigues, R.;
 Swift, C. and Mark, H.: Solar X-Ray and Diffuse
 Cosmic X-Ray Spectra Measured with a Satellite-Borne
 Instrument. Vol. 160, 1970, pp. 1177-1183.
- 72. Davidson, K.: Photoionization and the Emission-Line Spectra of Quasi-Stellar Objects. Vol. 171, 1972, pp. 213-231.
- 73. Davidson, K.; Pacini, F. and Salpeter, E. E.: A Cocoon
 Pulsar Model for Scorpius X-1. Vol. 168, 1971, pp. 45-55.
- 74. Davison, K. and Tucker, W.: Radiative Ionization of the Filaments in the Crab Nebula. Vol. 161, 1970, pp. 437-449.
- 75. Davison, P. J. N.; Buselli, G.; Clancy, M. C. and Thomas, R. M.: Weak X-Ray Sources in the Southern Hemisphere. Vol. 167, 1971, pp. 479-486.

- 76. De Young, D. S.: The Dynamics of Extended Extragalactic Radio Sources. Vol. 167, 1971, pp. 541-551.
- 77. Demoulin, M. and Burbidge, G. R.: Non-Thermal Optical Radiation from Galaxies. Vol. 154, 1968, pp. 3-20.
- 78. Dicke, R. H.: Scatter-Hole Cameras for X-Rays and Gamma Rays. Vol. 153, 1968, pp. L101-L106.
- 79. Downs, G. S. and Thompson, A. R.: The Distribution of Polarization in the Crab Nebula at a Wavelength of 9.8 cm. Vol. 152, 1968, pp. L65-L69.
- 80. Eggen, O. J.: Sco XR-1 as a Member of the Upper Scorpius Complex. Vol. 158, 1969, pp. L31-L34.
- 81. Eggen, O. J.; Freeman, K. C. and Sandage, A.: On the Optical Identification of the X-Ray Source Cen XR-2 as WX Cen. Vol. 154, 1968, pp. L27-L31.
- 82. Eggen, O. J. and Lynga, G.: Blue Objects Near Cen XR-2. Vol. 153, 1968, pp. L195-L197.
- 83. Eggen, O. J. and Rodgers, A. W.: Identification of S5003 Cen with the New Intense X-Ray Source in Centaurus. Vol. 158, 1969, pp. L111-L112.
- 84. Elliot, J. L.; Horowitz, P.; Liller, W.; Papaliolios, C. and Veverka, J.: A Search for an Optical Source at the Position of Centaurus XR-3. Vol. 168, 1971, pp. L95-L96.
- 85. Evans, W. D.; Belian, R. D. and Conner, J. P.: Observations of the Development and Disappearance of the X-Ray Source Centaurus XR-4. Vol. 159, 1970, pp. L57-L60.
- 86. Evans, W. D.; Belian, R. D.; Conner, J. P.; Strong, I. B.; Hiltner, W. A. and Kunkel, W. E.: X-Ray and Optical Variations of Scorpius X-1. Vol. 162, 1970, pp. L115-L119.
- 87. Fazio, G.G.; Helmken, H. F.; Rieke, G. H. and Weekes, T. C.:
 A Search for Discrete Sources of Cosmic Gamma Rays of
 Energies Near 2 x 1012 eV. Vol. 154, 1968, pp. L83-L89.
- 88. Fazio, G. G.; Stecker, F. W. and Wright, J. P.: Cosmic Black-Body Radiation, High-Energy Electrons, and the Origin of Isotropic X-Ray and Gamma Radiation. Vol. 144, 1966, pp. 611-614.

- 89. Feast, M. W.: Radial Velocities of the X-Ray Candidate Star S5003 Centauri. Vol. 160, 1970, pp. L171-L172.
- 90. Felten, J. E.: The Radiation and Physical Properties of the M87 Jet. Vol. 151, 1968, pp. 861-879.
- 91. Felten, J. E.; Arp, H. C. and Lynds, C. R.: The M87 Jet. II. Temperature, Ionization, and X-Radiation in a Secondary-Production Model. Vol. 159, 1970, pp. 415-423.
- 92. Felten, J. E.; Gould, R. J.; Stein, W. A. and Woolf, N. J.: X-Rays from the Coma Cluster of Galaxies. Vol. 146, 1966, pp. 955-958.
- 93. Felten, J. E. and Morrison, P.: Omnidirectional Inverse Compton and Synchrotron Radiation from Cosmic Distributions of Fast Electrons and Thermal Photons. Vol. 146, 1966, pp. 686-708.
- 94. Fichtel, C. E.; Hartman, R. C.; Kniffen, D. A. and Sommer, M.: Gamma-Ray Observations of the Galactic Center and Some Possible Point Sources. Vol. 171, 1972, pp. 31-40.
- 95. Fichtel, C. E.; Kniffen, D. A. and Ögelman, H. B.: Results of Gamma-Ray Balloon Astronomy. Vol. 158, 1969, pp. 193-206.
- 96. Fichtel, C. E.; Kniffen, D. A. and Ögelman, H. B.:
 Erratum: "Results of Gamma-Ray Balloon Astronomy."
 Vol. 168, 1971, p. 581.
- 97. Field, G. B.: Thermal Instability. Vol. 142, 1965, pp. 531-567.
- 98. Field, G. B. and Henry, R. C.: Free-Free Emission by Intergalactic Hydrogen. Vol. 140, 1964, pp. 1002-1012.
- 99. Finzi, A.: Neutron Stars as a Possible Source of X-Rays from Outside the Solar System. Vol. 139, 1964, pp. 1398-1399.
- 100. Finzi, A. and Wolf, R. A.: Hot, Vibrating Neutron Stars. Vol. 153, 1968, pp. 835-848.
- 101. Fisher, P. C.; Johnson, H. M.; Jordan, W. C.; Meyerott, A. J. and Acton, L. W.: Observations of Cosmic X-Rays. Vol. 143, 1966, pp. 203-217.

- 102. Fisher, P. C.; Jordan, W. C.; Meyerott, A. J.; Acton, L. W. and Roethig, D. T.: Observations of Galactic X-Ray Sources. Vol. 151, 1968, pp. 1-19.
- 103. Fisher, P. C.; Jordan, W. C.; Meyerott, A. J.; Acton, L. W. and Roethig, D. T.: X-Ray Spectra of Several Cosmic Sources. Vol. 147, 1967, pp. 1209-1213.
- 104. Fisher, P. C. and Meyerott, A. J.: Reply to Letter of Stuart Bowyer. Vol. 140, 1964, pp. 821-823.
- 105. Fisher, P. C. and Meyerott, A. J.: Stellar X-Ray Emission. Vol. 139, 1964, pp. 123-142.
- 106. Fishman, G. J.: Cosmic-Ray Effects on Diffuse Gamma-Ray Measurements. Vol. 171, 1972, pp. 163-167.
- 107. Fishman, G. J.; Harnden, Jr., F. R. and Haymes, R. C.:
 Observation of Pulsed Hard X-Radiation from NP 0532
 from 1967 Data. Vol. 156, 1969, pp. L107-L110.
- 108. Fishman, G. J.; Harnden, Jr., F. R.; Johnson III, W. N. and Haymes, R. C.: The Period and Hard-X-Ray Spectrum of NP 0532 in 1967. Vol. 158, 1969, pp. L61-L64.
- 109. Fishman, G. J.; Harnden, Jr., F. R.; Johnson III, W. N. and Haymes, R. C.: Erratum: "The Period and Hard-X-Ray Spectrum of NP 0532 in 1967." Vol. 160, 1970, p. L117.
- 110. Fowler, W. A.; Reeves, H. and Silk, J.: Spallation Limits on Interstellar Fluxes of Low-Energy Cosmic Rays and Nuclear Gamma Rays. Vol. 162, 1970, pp. 49-56.
- 111. Friedman, H. and Byram, E. T.: X-Rays from the Coma Cluster of Galaxies. Vol. 147, 1967, pp. 399-401.
- 112. Fritz, G.; Davidsen, A.; Meekins, J. F. and Friedman, H.: Discovery of an X-Ray Source in Perseus. Vol. 164, 1971, pp. L81-L85.
- 113. Fritz, G.; Meekins, J. F.; Chubb, T. A. and Friedman, H.:
 The X-Ray Spectra of the Crab Nebula and NP 0532.
 Vol. 164, 1971, pp. L55-L60.
- 114. Fritz, G.; Meekins, J. F.; Henry, R. C.; Byram, E. T. and Friedman, H.: Soft X-Rays from Scorpius XR-1. Vol. 153, 1968, pp. L199-L202.

- 115. Fritz, G.; Meekins, J. F.; Henry, R. C. and Friedman, H.:
 On X-Ray Line Emission from Scorpius XR-1. Vol. 156,
 1969, pp. L33-L36.
- 116. Frye, Jr., G. M. and Wang, C. P.: Survey of Possible Sources of Cosmic Gamma Rays Above 50 MeV in the Northern Hemisphere. Vol. 158, 1969, pp. 925-937.
- 117. Gatewood, G. and Sofia, S.: Physical Characteristics of Sco X-1. Vol. 154, 1968, pp. L69-L70.
- 118. Gebel, W. L. and Shore, S. N.: On the Nature of the Monoceros Supernova Remnant. Vol. 172, 1972, pp. L9-L12.
- 119. Giacconi, R.; Gorenstein, P.; Gursky, H.; Usher, P. D.; Waters, J. R.; Sandage, A.; Osmer, P. and Peach, J. V.: On the Optical Search for the X-Ray Sources Cyg X-1 and Cyg X-2. Vol. 148, 1967, pp. L129-L132.
- 120. Giacconi, R.; Gorenstein, P.; Gursky, H. and Waters, J. R.:
 An X-Ray Survey of the Cygnus Region. Vol. 148, 1967,
 pp. L119-L127.
- 121. Giacconi, R.; Gorenstein, P.; Gursky, H. and Waters, J. R.: Erratum: "An X-Ray Survey of the Cygnus Region." Vol. 149, 1967, p. L85.
- 122. Giacconi, R.; Gursky, H.; Kellogg, E.; Schreier, E. and
 Tananbaum, H.: Discovery of Periodic X-Ray Pulsations
 in Centaurus X-3 from Uhuru. Vol. 167, 1971, pp. L67-L73.
- 123. Giacconi, R.; Kellogg, E.; Gorenstein, P.; Gursky, H. and Tananbaum, H.: An X-Ray Scan of the Galactic Plane from Uhuru. Vol. 165, 1971, pp. L27-L35.
- 124. Glass, I. S.: Observations of X-Rays from Taurus X-1 and Cygnus X-1. Vol. 157, 1969, pp. 215-222.
- 125. Goldreich, P. and Julian, W. H.: Pulsar Electrodynamics. Vol. 157, 1969, pp. 869-880.
- 126. Goldsmith, D. and Silk, J.: Intergalactic Clouds in the Coma Cluster?. Vol. 172, 1972, pp. 563-575.
- 127. Goldsmith, D. W.; Habing, H. J. and Field, G. B.:
 Thermal Properties of Interstellar Gas Heated by
 Cosmic Rays. Vol. 158, 1969, pp. 173-183.

- 128. Goldwire, Jr., H. C. and Michel, F. C.: Analysis of the Slowing-Down Rate of NP 0532. Vol. 156, 1969, pp. L111-L114.
- 129. Gordon, M. A.: Radiation Transfer of Radio Recombination Lines in the Diffuse Interstellar Medium. Vol. 167, 1971, pp. 21-25.
- 130. Gordon, M. A. and Gottesman, S. T.: Electron Density and Temperature in the Diffuse Interstellar Medium Determined from Recombination Lines. Vol. 168, 1971, pp. 361-371.
- 131. Gorenstein, P.; Giacconi, R. and Gursky, H.: The Spectra of Several X-Ray Sources in Cygnus and Scorpio. Vol. 150, 1967, pp. L85-L94.
- 132. Gorenstein, P.; Giacconi, R. and Gursky, H.: X-Ray
 Spectral Data from GX3+1. Vol. 157, 1969, pp. 463-464.
- 133. Gorenstein, P.; Gursky, H. and Garmire, G.: The Analysis of X-Ray Spectra. Vol. 153, 1968, pp. 885-897.
- 134. Gorenstein, P.; Gursky, H.; Kellogg, E. M. and Giacconi, R.:
 An X-Ray Survey of the Cassiopeia Region and Its Implications
 Concerning Supernova Remmants and the Galactic Source
 Distribution. Vol. 160, 1970, pp. 947-957.
- 135. Gorenstein, P.; Harris, B. and Gursky, H.: Upper Limits to the Soft X-Ray Emission of Sources in Virgo. Vol. 172, 1972, pp. L41-L45.
- 136. Gorenstein, P.; Kellogg, E. M. and Gursky, H.: The Spectrum of Diffuse Cosmic X-Rays, 1-13 keV. Vol. 156, 1969, pp. 315-324.
- 137. Gorenstein, P.; Kellogg, E. M. and Gursky, H.: X-Ray Characteristics of Three Supernova Remnants. Vol. 160, 1970, pp. 199-208.
- 138. Goss, W. M. and Shaver, P. A.: A Radio Source Near the X-Ray Source GX3+1. Vol. 154, 1968, pp. L75-L76.
- 139. Gott III, J. R. and Gunn, J. E.: The Coma Cluster as an X-Ray Source: Some Cosmological Implications. Vol. 169, 1971, pp. L13-L15.

- 140. Gottesman, S. T. and Gordon, M. A.: Radio Recombination Lines from Diffuse Interstellar Gas. Vol. 162, 1970, pp. L93-L97.
- 141. Gould, R. J. and Burbidge, G. R.: X-Rays from the Galactic Center, External Galaxies, and the Intergalactic Medium. Vol. 138, 1963, pp. 969-977.
- 142. Gould, R. J. and Ramsay, W.: The Temperature of Intergalactic Matter. Vol. 144, 1966, pp. 587-598.
- 143. Gould, R. J. and Sciama, D. W.: Cosmic X- and Infrared Rays as Tools for Exploring the Large-Scale Structure of the Universe. Vol. 140, 1964, pp. 1634-1636.
- 144. Grader, R. J.; Hill, R. W.; Seward, F. D. and Hiltner, W. A.: The Soft X-Ray Spectra of Three Cosmic Sources and Simultaneous Optical Observations of Sco XR-1. Vol. 159, 1970, pp. 201-214.
- 145. Grader, R. J.; Hill, R. W.; Seward, F. D. and Hiltner, W. A.: Erratum: "The Soft X-Ray Spectra of Three Cosmic Sources and Simultaneous Observations of Sco X-1." Vol. 160, 1970, p. 1193.
- 146. Grader, R. J.; Hill, R. W. and Stoering, J. P.: Soft X-Rays from the Cygnus Loop. Vol. 161, 1970, pp. L45-L50.
- 147. Grindlay, J. E.: Flare Stars as X-Ray Sources. Vol. 162, 1970, pp. 187-198.
- 148. Gunn, J. E. and Peterson, B. A.: On the Density of Neutral Hydrogen in Intergalactic Space. Vol. 142, 1965, pp. 1633-1636.
- 149. Gursky, H.; Giacconi, R.; Gorenstein, P.; Waters, J. R.;
 Oda, M.; Bradt, H.; Garmire, G. and Sreekantan, B. V.:
 A Measurement of the Angular Size of the X-Ray Source Sco X-1.
 Vol. 144, 1966, pp. 1249-1252.
- 150. Gursky, H.; Giacconi, R.; Gorenstein, P.; Waters, J. R.; Oda, M.; Bradt, H.; Garmire, G. and Sreekantan, B. V.: Erratum: "A Measurement of the Angular Size of the X-Ray Source Sco X-1." Vol. 145, 1966, p. 968.

- 151. Gursky, H.; Giacconi, R.; Gorenstein, P.; Waters, J. R.; Oda, M.; Bradt, H.; Garmire, G. and Sreekantan, B. V.: A Measurement of the Location of the X-Ray Source Sco X-1. Vol. 146, 1966, pp. 310-316.
- 152. Gursky, H.; Gorenstein, P. and Giacconi, R.: The Distribution of Galactic X-Ray Sources from Scorpio to Cygnus. Vol. 150, 1967, pp. L75-L84.
- 153. Gursky, H.; Gorenstein, P.; Kerr, F. J. and Grayzeck, E. J.:
 The Estimated Distance to Cygnus X-1 Based on Its LowEnergy X-Ray Spectrum. Vol. 167, 1971, pp. L15-L21.
- 154. Gursky, H.; Kellogg, E.; Murray, S.; Leong, C.; Tananbaum, H. and Giacconi, R.: A Strong X-Ray Source in the Coma Cluster Observed by Uhuru. Vol. 167, 1971, pp. L81-L84.
- 155. Gursky, H.; Kellogg, E. M. and Gorenstein, P.: The Location of the X-Ray Source in Vela. Vol. 154, 1968, pp. L71-L74.
- 156. Gursky, H.; Kellogg, E. M.; Leong, C.; Tananbaum, H. and Giacconi, R.: Detection of X-Rays from the Seyfert Galaxies NGC 1275 and NGC 4151 by the Uhuru Satellite. Vol. 165, 1971, pp. L43-L48.
- 157. Habing, H. J. and Goldsmith, D. W.: Heating of the Interstellar Medium by X-Rays and Cosmic Rays. Vol. 166, 1971, pp. 525-541.
- 158. Harnden, Jr., F. R.; Johnson III, W. N. and Haymes, R. C.: Evidence for Hard X-Ray Pulsations from the Vela Pulsar. Vol. 172, 1972, pp. L91-L94.
- 159. Hartle, J. B. and Thorne, K. S.: Slowly Rotating Relativistic Stars. II. Models for Neutron Stars and Supermassive Stars. Vol. 153, 1968, pp. 807-834.
- 160. Hawking, S. W. and Ellis, G. F. R.: The Cosmic Black-Body Radiation and the Existence of Singularities in Our Universe. Vol. 152, 1968, pp. 25-36.
- 161. Haymes, R. C.; Ellis, D. V.; Fishman, G. J.; Glenn, S. W. and Kurfess, J. D.: Detection of Gamma Radiation from the Cygnus Region. Vol. 151, 1968, pp. L125-L129.
- 162. Haymes, R. C.; Ellis, D. V.; Fishman, G. J.; Glenn, S. W. and Kurfess, J. D.: Detection of Hard X-Radiation from Virgo. Vol. 151, 1968, pp. L131-L134.

- 163. Haymes, R. C.; Ellis, D. V.; Fishman, G. J.; Glenn, S. W. and Kurfess, J. D.: Observation of Hard Radiation from the Region of the Galactic Center. Vol. 157, 1969, pp. 1455-1459.
- 164. Haymes, R. C.; Ellis, D. V.; Fishman, G. J.; Glenn, S. W. and Kurfess, J. D.: Search for Gamma Radiation from Centaurus A. Vol. 155, 1969, pp. L31-L34.
- 165. Haymes, R. C.; Ellis, D. V.; Fishman, G. J.; Kurfess, J. D. and Tucker, W. H.: Observation of Gamma Radiation from the Crab Nebula. Vol. 151, 1968, pp. L9-L14.
- 166. Haymes, R. C. and Harnden, Jr., F. R.: Low-Energy Gamma Radiation from Cygnus. Vol. 159, 1970, pp. 1111-1114.
- 167. Haymes, R. C.; Harnden, Jr., F. R.; Johnson III, W. N.;
 Prichard, H. M. and Bosch, H. E.: The Low-Energy Gamma-Ray
 Spectrum of Scorpius X-1. Vol. 172, 1972, pp. L47-L49.
- 168. Heiles, C.: Supernova Shells and Galactic X-Rays. Vol. 140, 1964, pp. 470-476.
- 169. Henriksen, R. N.; Feldman, P. A. and Chau, W. Y.:
 Dissipative Processes in Neutron-Star Crusts and the
 Production of Blackbody X-Ray Sources. Vol. 172, 1972, pp.
 717-728.
- 170. Henry, R. C.: Absence of Lyman-Alpha Emission from the Coma Cluster of Galaxies. Vol. 172, 1972, pp. L97-L100.
- 171. Henry, R. C.; Fritz, G.; Meekins, J. F.; Chubb, T. and Friedman, H.: Excess Background Radiation of Soft X-Rays at the Galactic Pole and Plane. Vol. 163, 1971, pp. L73-L77.
- 172. Henry, R. C.; Fritz, G.; Meekins, J. F.; Friedman, H. and
 Byram, E. T.: Possible Detection of a Dense Intergalactic
 Plasma. Vol. 153, 1968, pp. L11-L18.
- 173. Hill, R. W.; Burginyon, G.; Grader, R. J.; Palmieri, T. M.; Seward, F. D. and Stoering, J. P.: A Soft X-Ray Survey from the Galactic Center to Vela. Vol. 171, 1972, pp. 519-528.
- 174. Hill, R. W.; Grader, R. J. and Seward, F. D.: The Soft X-Ray Spectrum of Sco XR-1. Vol. 154, 1968, pp. 655-660.

- 175. Hillier, R. R.; Jackson, W. R.; Murray, A.; Redfern, R. M. and Sale, R. G.: Low-Energy Gamma Rays from NP 0532. Vol. 162, 1970, pp. L177-L180.
- 176. Hiltner, W. A.; Mook, D. E.; Ludden, D. J. and Graham, D.:
 On the Polarization of Sco X-1. Vol. 148, 1967, pp. L47-L48.
- 177. Hjellming, R. M. and Wade, C. M.: Radio Emission from X-Ray Sources. Vol. 168, 1971, pp. L21-L24.
- 178. Hjellming, R. M. and Wade, C. M.: The Radio Sources Associated with Scorpius X-1. Vol. 164, 1971, pp. L1-L7.
- 179. Hobbs, R. W. and Marionni, P.: Search for 3.5 Millimeter Continuum Radiation from Infrared Stars and Related Objects. Vol. 167, 1971, pp. 85-87.
- 180. Holt, S. S.; Boldt, E. A.; Schwartz, D. A.; Serlemitsos, P. J. and Bleach, R. D.: Evidence for Multiple Periodicity in the X-Ray Emission from Cygnus X-1. Vol. 166, 1971, pp. L65-L68.
- 181. Holt, S. S.; Boldt, E. A. and Serlemitsos, P. J.: Iron Line Emission from X-Ray Sources. Vol. 154, 1968, pp. L137-L140.
- 182. Holt, S. S.; Boldt, E. A. and Serlemitsos, P. J.: Search for Line Structure in the X-Ray Spectrum of Sco X-1. Vol. 158, 1969, pp. L155-L158.
- 183. Horowitz, P.; Papaliolios, C. and Carleton, N. P.: Results of a Search for Optical Pulsars. Vol. 163, 1971, pp. L5-L10.
- 184. Houck, J. R. and Harwit, M.: Far-Infrared Nightsky Emission Above 120 Kilometers. Vol. 157, 1969, pp. L45-L48.
- 185. Hoyle, F.: X-Rays from Outside the Solar System. Vol. 137, 1963, pp. 993-995.
- 186. Hudson, H. S.; Peterson, L. E. and Schwartz, D. A.:
 Simultaneous X-Ray and Optical Observations of Sco X-1
 Flares. Vol. 159, 1970, pp. L51-L55.
- 187. Hughes, V. A.; Feldman, P. A. and Woodsworth, A.: Radio Observations of Magnetic White Dwarfs. Vol. 170, 1971, pp. L125-L126.

- 188. Hunter, C.: The Rotation and Angular Momentum of Galaxies. Vol. 162, 1970, pp. 445-452.
- 189. Inman, C. L.: Baryon Star Models. Vol. 141, 1965, pp. 187-194.
- 190. Jackson, P. D. and Kerr, F. J.: Detection of Radio Recombination-Line Emission Associated with Distributed Ionized Hydrogen. Vol. 168, 1971, pp. 29-35.
- 191. Jenkins, E. B.; Morton, D. C. and Matilsky, T. A.: Interstellar L α Absorption in β^1 , δ and π Scorpii. Vol. 158, 1969, pp. 473-478.
- 192. Johnson, H. M.: $H\beta$ Photometry of the Night Sky. Vol. 164, 1971, pp. 379-382.
- 193. Johnson, H. M.: Physical Characteristics of Sco X-1. Vol. 146, 1966, pp. 960-961.
- 194. Johnson, H. M.: Physical Characteristics of Sco X-1. II. Vol. 147, 1967, pp. 1213-1218.
- 195. Johnson, H. M.: Physical Characteristics of Sco X-1. III. Vol. 154, 1968, pp. 1139-1141.
- 196. Johnson, H. M.: The Distribution of X-Ray Sources in the Galaxy. Vol. 143, 1966, pp. 261-263.
- 197. Johnson, H. M.: The Sky Near the Brightest X-Ray Source in Scorpius. Vol. 144, 1966, pp. 635-638.
- 198. Johnson, H. M.: The Sky Near the Brightest X-Ray Source in Scorpius. III. Vol. 164, 1971, pp. 67-76.
- 199. Johnson, H. M. and Golson, J. C.: Narrow-Band and UBV Photometry of GX3+1 and Two Wolf-Rayet Stars. Vol. 154, 1968, pp. L77-L82.
- 200. Johnson, H. M. and Golson, J. C.: Narrow-Band and UBV Photometry of Sco X-1. Vol. 153, 1968, pp. 307-312.
- 201. Johnson, H. M. and Golson, J. C.: Narrow-Band Photometry of Five Combination Variable Stars and the X-Ray Source Cyg X-2. Vol. 155, 1969, pp. L91-L96.

- 202. Johnson, H. M.; Spinrad, H.; Taylor, B. J. and Peimbert, M.: Photoelectric Scanner Spectrophotometry of Sco X-1. Vol. 149, 1967, pp. L45-L50.
- 203. Johnson, H. M. and Stephenson, C. B.: A Possible Old Nova Near Sco X-1. Vol. 146, 1966, pp. 602-605.
- 204. Johnson III, W. N.; Harnden, Jr., F. R. and Haymes, R. C.:
 The Spectrum of Low-Energy Gamma Radiation from the Galactic-Center Region. Vol. 172, 1972, pp. L1-L7.
- 205. Jones, F. C.: Suprathermal Proton Bremsstrahlung by the Weizsäcker-Williams Method. Vol. 169, 1971, pp. 503-506.
- 206. Jones, T. W. and Kellogg, P. J.: Limitations on Thermal and Nonthermal Models for the Radiation from Extragalactic Sources. Vol. 172, 1972, pp. 283-298.
- 207. Kafatos, M. C. and Morrison, P.: Fossil Strömgren Spheres from Supernova Explosions. Vol. 168, 1971, pp. 195-201.
- 208. Kellogg, E.; Gursky, H.; Leong, C.; Schreier, E.; Tananbaum,
 H. and Giacconi, R.: X-Ray Observations of the Virgo
 Cluster, NGC 5128, and 3C 273 from the Uhuru Satellite. Vol. 165,
 1971, pp. L49-L54.
- 209. Kellogg, E.; Gursky, H.; Murray, S.; Tananbaum, H. and Giacconi, R.: X-Ray Sources Near the Galactic Center Observed by Uhuru. Vol. 169, 1971, pp. L99-L103.
- 210. Kestenbaum, H.; Angel, J. R. P. and Novick, R.: X-Ray Spectrum of Scorpius X-1 Obtained with a Bragg Crystal Spectrometer. Vol. 164, 1971, pp. L87-L93.
- 211. Kestenbaum, H.; Angel, J. R. P.; Novick, R. and Cocke, W. J.: Correlated Transient Short-Period Oscillation in the Optical and X-Ray Flux from Scorpius X-1. Vol. 169, 1971, pp. L49-L55.
- 212. Kiang, T.: Jets and Filaments in Haro's Violet Galaxies. Vol. 150, 1967, pp. L31-L32.
- 213. Kraft, R. P. and Demoulin, M.: On the Remarkable Spectroscopic Complexities of Cyg X-2. Vol. 150, 1967, pp. L183-L188.
- 214. Kraft, R. P. and Miller, J. S.: Further Spectroscopic Observations of the Optical Object Identified with X-Ray Source Cygnus X-2. Vol. 155, 1969, pp. L159-L161.

- 215. Krishnan, T.; Zisk, S. H. and Cudaback, D. D.: The Crab Nebula at 1420 MHz. Vol. 150, 1967, pp. 67-77.
- 216. Kristian, J.; Brucato, R.; Visvanathan, N.; Lanning, H.; Sandage, A.: On the Optical Identification of Cygnus X-1. Vol. 168, 1971, pp. L91-L93.
- 217. Kristian, J.; Sandage, A. and Westphal, J. A.: Rapid Photometric and Spectroscopic Variations of the X-Ray Source Cyg X-2. Vol. 150, 1967, pp. L99-L105.
- 218. Kristian, J.; Visvanathan, N.; Westphal, J. A. and Snellen, G. H.: Optical Polarization and Intensity of the Pulsar in the Crab Nebula. Vol. 162, 1970, pp. 475-483.
- 219. Kunkel, W. E. and Bradt, H. V.: Identification of the Nucleus of NGC 5128. Vol. 170, 1971, pp. L7-L10.
- 220. Kunkel, W.; Osmer, P.; Smith, M.; Hoag, A.; Schroeder, D.;
 Hiltner, W. A.; Bradt, H.; Rappaport, S. and Schnopper,
 H. W.: An Optical Search for the X-Ray Sources GX3+1
 GX5-1, GX9+1, and GX17+2. Vol. 161, 1970, pp. L169-L172.
- 221. Kurfess, J. D.: Observation of Low-Energy Gamma Radiation from NP 0532. Vol. 168, 1971, pp. L39-L42.
- 222. Lampton, M.; Bowyer, C. S. and Harrington, S.: A Search for Rapid Optical Oscillations in Scorpius XR-1.
 Vol. 162, 1970, pp. 181-186.
- 223. Lampton, M.; Bowyer, S.; Mack, J. E. and Margon, B.: X-Ray Observations of Virgo XR-1. Vol. 168, 1971, pp. L1-L6.
- 224. Lampton, M.; Bowyer, S.; Welch, J. and Grasdalen, G.:
 Simultaneous Radio and Optical Measurements of Scorpius
 XR-1. Vol. 164, 1971, pp. L61-L65.
- 225. Lampton, M.; Margon, B.; Bowyer, S.; Mahoney, W. and Anderson, K.: The X-Ray Spectrum of NGC 5128. Vol. 171, 1972, pp. L45-L50.
- 226. Landstreet, J. D. and Angel, J. R. P.: The Optical Polarization of Scorpius X-1. Vol. 172, 1972, pp. 443-446.
- 227. Lawrence, G. M.; Ostriker, J. P. and Hesser, J. E.: Ultrashort-Period Stellar Oscillations. I. Results from White Dwarfs, Old Novae, Central Stars of Planetary Nebulae, 3C 273, and 'Scorpius XR-1. Vol. 148, 1967, pp. L161-L163.

- 228. Leong, C.; Kellogg, E.; Gursky, H.; Tananbaum, H. and Giacconi, R.: X-Ray Emission from the Magellanic Clouds Observed by Uhuru. Vol. 170, 1971, pp. L67-L71.
- 229. Lerche, I.: On the Motion of Current Sheets, and the Radio, Optical, and X-Ray Emission from Pulsars. Vol. 159, 1970, pp. 229-237.
- 230. Lerche, I.: On the Motion of Current Sheets, and the Radio, Optical, and X-Ray Emission from Pulsars. II. Pulse Structure, Polarization, Time-Varying Features, and Tight-Beam Emission. Vol. 160, 1970, pp. 1003-1017.
- 231. Lerche, I.: On the Motion of Current Sheets, and the Radio, Optical, and X-Ray Emission from Pulsars. III. The Independent-Particle Picture and Radiation. Vol. 162, 1970, pp. 153-160.
- 232. Lewin, W. H. G.; Clark, G. W. and Smith, W. B.: Observation of an X-Ray Flare from Sco X-1. Vol. 152, 1968, pp. L55-L61.
- 233. Lewin, W. H. G.; Clark, G. W. and Smith, W. B.: Observation of Cen XR-2 and Other High-Energy X-Ray Sources in the Southern Sky. Vol. 152, 1968, pp. L49-L53.
- 234. Lewin, W. H. G.; Clark, G. W. and Smith, W. B.: Spectral Data on Sco X-1 in the Energy Range from 20 to 100 keV. Vol. 150, 1967, pp. L153-L155.
- 235. Lewin, W. H. G.; McClintock, J. E.; Ryckman, S. G.; Glass, I. S. and Smith, W. B.: Continual Variations in the High-Energy Flux of X-Rays from Scorpius X-1. Vol. 162, 1970, pp. L109-L113.
- 236. Lewin, W. H. G.; McClintock, J. E.; Ryckman, S. G. and Smith, W. B.: Detection of a High-Energy X-Ray Flare from a Source in Crux. Vol. 166, 1971, pp. L69-L72.
- 237. Lewin, W. H. G.; McClintock, J. E. and Smith, W. B.:
 Decrease in the High-Energy X-Ray Flux from Centaurus
 XR-2. Vol. 159, 1970, pp. L193-L196.
- 238. Lewin, W. H. G.; Ricker, G. R. and McClintock, J. E.: X-Rays from a New Variable Source GX 1+4. Vol. 169, 1971, pp. L17-L21.
- 239. Loh, E. D. and Garmire, G. P.: Radiative Transfer in an Ionized Medium at High Temperature. Vol. 166, 1971, pp. 301-309.

- 240. Lynds, C. R.: Spectroscopic Observations of Cyg X-2. Vol. 149, 1967, pp. L41-L43.
- 241. Lynds, R.; Maran, S. P. and Trumbo, D. E.: Optical Identification and Observations of the Pulsar NP 0532. Vol. 155, 1969, pp. L121-L125.
- 242. MacGregor, A.; Seward, F. and Turiel, I.: Observation of Galactic X-Ray Sources 1968 November 3. Vol. 161, 1970, pp. 979-986.
- 243. Macklin, R. L.: Were the Lightest Stable Isotopes Produced by Photodissociation? Vol. 162, 1970, pp. 353-355.
- 244. Manchester, R. N.: Observations of the Crab Pulsar at 410 and 1664 MHz. Vol. 163, 1971, pp. L61-L63.
- 245. Manley, O. P.: Free-Free Emission as a Source of Galactic X-Rays. Vol. 144, 1966, pp. 628-634.
- 246. Manley, O. P.: Problems Relating to Magnetic Fields in Neutron Stars. Vol. 147, 1967, pp. 808-810.
- 247. Manley, O. P.: X-Ray Emission from Sco X-1. Vol. 144, 1966, pp. 1253-1257.
- 248. Manley, O. P. and Olbert, S.: Models of X-Ray Stars. Vol. 157, 1969, pp. 223-246.
- 249. Margon, B.; Bowyer, S.; Lampton, M. and Cruddace, R.:
 Evidence for a Highly Compact X-Ray Source. Vol. 169,
 1971, pp. L45-L48.
- 250. Margon, B.; Lampton, M.; Bowyer, S. and Cruddace, R.: A Pulsing X-Ray Source in Circinus. Vol. 169, 1971, pp. L23-L25.
- 251. Mark, H.; Price, R.; Rodrigues, R.; Seward, F. D. and Swift, C. D.: Detection of X-Rays from the Large Magellanic Cloud. Vol. 155, 1969, pp. L143-L144.
 - 252. Mark, H.; Price, R. E.; Rodrigues, R.; Seward, F. D.; Swift, C. D. and Hiltner, W. A.: Further Simultaneous Observations of the Optical and X-Ray Spectra of Sco X-1. Vol. 156, 1969, pp. L67-L72.

- 253. Mark, H.; Price, R.; Rodrigues, R.; Seward, F.; Swift, C. and Hiltner, W.: Erratum: "Further Simultaneous Observations of the Optical and X-Ray Spectra of Sco X-1." Vol. 158, 1969, p. L131.
- 254. May, T. C. and Waddington, C. J.: A Search for Energetic Gamma-Ray Emission from the Supernova Remnant Cassiopeia A. Vol. 156, 1969, pp. 437-444.
- 255. Mayer, W.; Bradt, H. V. and Rappaport, S.: Positions of X-Ray Sources in the Sagittarius Region. Vol. 159, 1970, pp. L115-L120.
- 256. McCammon, D.; Bunner, A. N.; Coleman, P. L. and Kraushaar, W. L.: A Search for Absorption of the Soft X-Ray Diffuse Flux by the Small Magellanic Cloud. Vol. 168, 1971, pp. L33-L37.
- 257. McClintock, J. E.; Ricker, G. R. and Lewin, W. H. G.: Rapid Fluctuations in the High-Energy X-Ray Flux from a Source in Crux. Vol. 166, 1971, pp. L73-L76.
- 258. McCray, R.: The Electromagnetic Spectrum of Eta Carinae. Vol. 147, 1967, pp. 544-555.
- 259. Meekins, J. F.; Henry, R. C.; Fritz, G.; Friedman, H. and Byram, E. T.: X-Ray Spectra of Several Discrete Cosmic Sources. Vol. 157, 1969, pp. 197-213.
- 260. Meltzer, D. W. and Thorne, K. S.: Normal Modes of Radial Pulsation of Stars at the End Point of Thermonuclear Evolution. Vol. 145, 1966, pp. 514-543.
- 261. Michel, F. C.: Acceleration of Relativistic Particles in the Crab Nebula. Vol. 157, 1969, pp. 1183-1199.
- 262. Michel, F. C.: Addendum: "Acceleration of Relativistic Particles in the Crab Nebula." Vol. 161, 1970, p. 801.
- 263. Miller, J. S. and Mathews, W. G.: The Recombination Spectrum of the Planetary Nebula NGC 7027. Vol. 172, 1972, pp. 593-607.
- 264. Minkowski, R. and Johnson, H. M.: The Peculiar Nebula NGC 6302. Vol. 148, 1967, pp. 659-662.
- 265. Miyamoto, S.; Fujii, M.; Matsuoka, M.; Nishimura, J.; Oda, M.; Ogawara, Y.; Ohta, S. and Wada, M.: Measurement of the Location of the X-Ray Source Cygnus X-1. Vol. 168, 1971, pp. L11-L14.

- 266. Moffet, A. T. and Berge, G. L.: Attempts to Detect Radio Emission from Two Galactic X-Ray Sources. Vol. 153, 1968, pp. 997-1000.
- 267. Mook, D.; Hiltner, W. A. and Lynds, R.: Spectroscopic Observations of Scorpius X-1. Vol. 163, 1971, pp. L69-L71.
- 268. Mook, D. E.: UBV Photometry of Sco XR-1. Vol. 150, 1967, pp. L25-L30.
- 269. Morton, D. C.: Neutron Stars as X-Ray Sources. Vol. 140, 1964, pp. 460-469.
- 270. Mumford, G. S.: Three-Color Observations of Scorpius X-1,
 Nova Herculis 1963, Nova GK Persei 1901, and MH α
 328-116. Vol. 146, 1966, pp. 962-964.
- 271. Neugebauer, G. and Oke, J. B.: A Study of Visual and Infrared Observations of Sco XR-1. Vol. 155, 1969, pp. 1-9.
- 272. Ney, E. P. and Stein, W. A.: Observations of the Crab Nebula at λ = 5800 Å, 2.2 μ , and 3.5 μ with a 4-Minute Beam. Vol. 152, 1968, pp. L21-L24.
- 273. Niel, M.; Vedrenne, G. and Bouigue, R.: Possible Observation of High-Energy Gamma Rays from the Cygnus Region. Vol. 171, 1972, pp. 529-536.
- 274. Nikulin, N. S.; Kuvshinov, V. M. and Severny, A. B.: On the Circular Polarization of Some Peculiar Objects. Vol. 170, 1971, pp. L53-L58.
- 275. Noerdlinger, P. D.: Models for the Stabilization of Clusters of Galaxies by Hot Gas Consistent with Observations of PKS 1116 + 12. Vol. 164, 1971, pp. 217-221.
- 276. Noerdlinger, P. D.: Quasi-Stellar Objects and the Density of Intergalactic Hydrogen. Vol. 156, 1969, pp. 841-846.
- 277. Noerdlinger, P. D.: The Dissolution of Early Clusters of Galaxies by Strong Quasi-Stellar Sources. Vol. 159, 1970, pp. L179-L183.
- 278. Oda, M.; Bradt, H.; Garmire, G.; Spada, G.; Sreekantan, B. V.; Gursky, H.; Giacconi, R.; Gorenstein, P. and Waters, J. R.: The Size and Position of the X-Ray Source in the Crab Nebula. Vol. 148, 1967, pp. L5-L11.

- 279. Oda, M.; Gorenstein, P.; Gursky, H.; Kellogg, E.; Schreier, E.; Tananbaum, H. and Giacconi, R.: X-Ray Pulsations from Cygnus X-1 Observed from Uhuru. Vol. 166, 1971, pp. L1-L7.
- 280. Oda, M.; Wada, M.; Matsuoka, M.; Miyamoto, S.; Muranaka, N. and Ogawara, Y.: Dynamic Spectrum Analysis of Cygnus X-1. Vol. 172, 1972, pp. L13-L16.
- 281. O'Dell, C. R.: Positional Correlations of Galactic Objects and X-Ray Sources. Vol. 147, 1967, pp. 855-857.
- 282. Oke, J. B. and Sargent, W. L. W.: The Nucleus of the Seyfert Galaxy NGC 4151. Vol. 151, 1968, pp. 807-823.
- 283. Onyejuba, P. E. and Gaustad, J. E.: Absorption Lines in Neutron-Star Spectra. Vol. 147, 1967, pp. 806-808.
- 284. Orszag, A. A.: Neutron-Star Atmospheres. Vol. 142, 1965, pp. 473-478.
- 285. Ostriker, J. P. and Gunn, J. E.: On the Nature of Pulsars. I. Theory. Vol. 157, 1969, pp. 1395-1417.
- 286. Overbeck, J. W.: Small-Angle Scattering of Celestial X-Rays by Interstellar Grains. Vol. 141, 1965, pp. 864-866.
- 287. Overbeck, J. W. and Tananbaum, H. D.: Time Variations in Scorpius X-1 and Cygnus XR-1. Vol. 153, 1968, pp. 899-908.
- 288. Overbeck, J. W.; Womack, E. A. and Tananbaum, H. D.: High-Energy X-Rays from Cygnus XR-1. Vol. 150, 1967, pp. 47-56.
- 289. Pacini, F.: A Possible Interpretation of the Precursor Pulse in NP 0532. Vol. 169, 1971, pp. L11-L12.
- 290. Pacini, F.: The Secular Decrease of the Optical and X-Ray Luminosity of Pulsars. Vol. 163, 1971, pp. L17-L19.
- 291. Palmieri, T. M.; Burginyon, G.; Grader, R. J.; Hill, R. W.; Seward, F. D. and Stoering, J. P.: Soft X-Rays from Two Supernova Remnants. Vol. 164, 1971, pp. 61-66.
- 292. Palmieri, T. M.; Burginyon, G. A.; Grader, R. J.; Hill, R. W.; Seward, F. D. and Stoering, J. P.: Diffuse Cosmic X-Ray Flux from 0.2 to 2 keV. Vol. 169, 1971, pp. 33-39.
- 293. Peimbert, M.; Spinrad, H.; Taylor, B. J. and Johnson, H. M.: Photoelectric Scanner Spectrophotometry of Cyg X-2. Vol. 151, 1968, pp. L93-L97.

- 294. Peterson, L. E. and Jacobson, A. S.: The Spectrum of Scorpius XR-1 to 50 keV. Vol. 145, 1966, pp. 962-965.
- 295. Pollack, J. B.; Guthrie, P. D. and Shen, B. S. P.: On the Absorption of Gamma Rays by Photons in Pulsars, Quasi-Stellar Objects, and Other Source Objects. Vol. 169, 1971, pp. L113-L116.
- 296. Polucci, G.; Bradt, H. V.; Mayer, W. and Rappaport, S.:
 Upper Limits on the Angular Sizes of Three X-Ray Sources
 in the Sagittarius Region. Vol. 159, 1970, pp. L109-L113.
- 297. Prendergast, K. H. and Burbidge, G. R.: On the Nature of Some Galactic X-Ray Sources. Vol. 151, 1968, pp. L83-L88.
- 298. Price, R. E.; Groves, D. J.; Rodrigues, R. M.; Seward, F. D.; Swift, C. D. and Toor, A.: X-Rays from the Magellanic Clouds. Vol. 168, 1971, pp. L7-L9.
- 299. Ramaty, R.; Boldt, E. A.; Colgate, S. A. and Silk, J.:
 Ionization and Heating of the Gum Nebula by Energetic
 Particles from the Vela X Supernova. Vol. 169, 1971,
 pp. 87-96.
- 300. Rankin, J. M.; Comella, J. M.; Craft, Jr., H. D.; Richards, D. W.; Campbell, D. B. and Counselman III, C. C.: Radio Pulse Shapes, Flux Densities, and Dispersion of Pulsar NP 0532. Vol. 162, 1970, pp. 707-725.
- 301. Rao, U. R.; Chitnis, E. V.; Prakasarao, A. S. and Jayanthi, U. B.: X-Ray Flux from Centaurus X-2 in the Energy Range 2-20 keV. Vol. 157, 1969, pp. L127-L132.
- 302. Rao, U. R.; Jayanthi, U. B. and Prakasarao, A. S.: Energy Spectrum and Time Variation of Sco X-1. Vol. 157, 1969, pp. L133-L137.
- 303. Rappaport, S.; Bradt, H. V. and Mayer, W.: Interstellar Absorption of 10-A X-Rays. Vol. 157, 1969, pp. L21-L25.
- 304. Rappaport, S.; Doxsey, R. and Zaumen, W.: A Search for X-Ray Pulsations from Cygnus X-1. Vol. 168, 1971, pp. L43-L47.
- 305. Rappaport, S.; Zaumen, W. and Doxsey, R.: On the Location of Cygnus X-1. Vol. 168, 1971, pp. L17-L20.
- 306. Rappaport, S.; Zaumen, W.; Doxsey, R. and Mayer, W.:
 GX 349 + 2 and GX 340 + 0: Locations and X-Ray
 Pulsation Limits. Vol. 169, 1971, pp. L93-L97.

- 307. Rees, M. J. and Sciama, D. W.: The Detection of Heavy Elements in Intergalactic Space. Vol. 147, 1967, pp. 353-356.
- 308. Rees, M. J. and Sciama, D. W.: The Kinetic Temperature and Ionization Level of Intergalactic Hydrogen in a Steady-State Universe. Vol. 145, 1966, pp. 6-20.
- 309. Rees, M. J. and Simon, M.: Evidence for Relativistic Expansion in Variable Radio Sources. Vol. 152, 1968, pp. L145-L148.
- 310. Riegler, G. R.; Boldt, E. and Serlemitsos, P.: A Comparison of the X-Ray Spectra from Tau XR-1 and the Vicinity of Sgr XR-1. Vol. 153, 1968, pp. L95-L99.
- 311. Rieke, G. H. and Weekes, T. C.: Production of Cosmic Gamma Rays by Compton Scattering in Discrete Sources. Vol. 155, 1969, pp. 429-437.
- 312. Rose, W. K.: A Model for the Nova Outburst. Vol. 152, 1968, pp. 245-253.
- 313. Rose, W. K.: Pulsational Instability in Helium Shell-Burning Stars. Vol. 150, 1967, pp. 193-202.
- 314. Ruderman, M. A. and Spiegel, E. A.: Galactic Wakes. Vol. 165, 1971, pp. 1-15.
- 315. Sandage, A.; Westphal, J. A. and Kristian, J.: Results of Five Nights of Continuous Monitoring of the Optical Flux from Sco X-1. Vol. 156, 1969, pp. 927-942.
- 316. Sandage, A. R.; Osmer, P.; Giacconi, R.; Gorenstein, P.; Gursky, H.; Waters, J.; Bradt, H.; Garmire, G.; Sreekantan, B. V.; Oda, M.; Osawa, K. and Jugaku, J.: On the Optical Identification of Sco X-1. Vol. 146, 1966, pp. 316-322.
- 317. Sartori, L. and Morrison, P.: Thermal X-Rays from Non-Thermal Radio Sources. Vol. 150, 1967, pp. 385-403.
- 318. Scargle, J. D.: Activity in the Crab Nebula. Vol. 156, 1969, pp. 401-426.

- 319. Schild, R. E.: HDE 310376: A Rapid Variable Star Similar to Scorpius XR-1. Vol. 157, 1969, pp. 709-715.
- 320. Schnopper, H. W.; Bradt, H. V.; Rappaport, S.; Boughan, E.; Burnett, B.; Doxsey, R.; Mayer, W. and Watt, S.: Precise Location of Sagittarius X-Ray Sources with a Rocket-Borne Rotating Modulation Collimator. Vol. 161, 1970, pp. L161-L167.
- 321. Schreier, E.; Gursky, H.; Kellogg, E.; Tananbaum, H. and Giacconi, R.: Further Observations of the Pulsating X-Ray Source Cygnus X-1 from Uhuru. Vol. 170, 1971, pp. L21-L27.
- 322. Schreier, E.; Levinson, R.; Gursky, H.; Kellogg, E.;
 Tananbaum, H. and Giacconi, R.: Evidence for the Binary
 Nature of Centaurus X-3 from Uhuru X-Ray Observations.
 Vol. 172, 1972, pp. L79-L89.
- 323. Schwartz, D. A.: The Isotropy of the Diffuse Cosmic X-Rays Determined by OSO-III. Vol. 162, 1970, pp. 439-444.
- 324. Schwartz, D. A.; Hudson, H. S. and Peterson, L. E.: The Spectrum of Diffuse Cosmic X-Rays: 7.7 113 keV. Vol. 162, 1970, pp. 431-437.
- 325. Seielstad, G. A. and Weiler, K. W.: One-Dimensional
 Polarization Distributions Over Four Supernova Remnants at
 1418 MHz. Vol. 154, 1968, pp. 817-832.
- 326. Seward, F.; Chodil, G.; Mark, H.; Swift, C. and Toor, A.: Diffuse Cosmic X-Ray Background Between 4 and 40 keV. Vol. 150, 1967, pp. 845-850.
- 327. Seward, F. D.; Burginyon, G. A.; Grader, R. J.; Hill, R. W.; Palmieri, T. M. and Stoering, J. P.: X-Rays from Puppis A and the Vicinity of Vela X. Vol. 169, 1971, pp. 515-524.
- 328. Seward, F. D. and Toor, A.: Search for 8-80 keV X-Rays from the Large Magellanic Cloud and the Crab Nebula. Vol. 150, 1967, pp. 405-411.
- 329. Shen, C. S. and Berkey, G.: Cosmic Gamma Rays from Inverse Compton Scattering. Vol. 151, 1968, pp. 895-900.
- 330. Shklovsky, I. S.: On the Nature of the Source of X-Ray Emission of Sco XR-1. Vol. 148, 1967, pp. L1-L4.

- 331. Shklovsky, I. S.: Pulsar NP 0532 and the Ejection of Relativistic Particles into the Crab Nebula. Vol. 159, 1970, pp. L77-L80.
 - 332. Shukla, P. G. and Wilson, B. G.: Low-Energy Cosmic X-Rays. Vol. 164, 1971, pp. 265-273.
 - 333. Shukla, P. G. and Wilson, B. G.: Erratum: "Low-Energy Cosmic X-Rays." Vol. 168, 1971, p. 319.
 - 334. Shulman, S.; Fritz, G.; Meekins, J. F.; Chubb, T. A.; Friedman, H. and Henry, R. C.: Line Emission in the X-Ray Background. Vol. 166, 1971, pp. L9-L12.
 - 335. Shulman, S.; Fritz, G.; Meekins, J. F.; Friedman, H. and Meidav, M.: X-Ray Intensity Fluctuations in Cygnus XR-1. Vol. 168, 1971, pp. I49-L51.
 - 336. Silk, J.: Forbidden-Line Emission from Hot HI Regions. Vol. 161, 1970, pp. L37-L40.
 - 337. Silk, J.: Intergalactic Clouds. Vol. 160, 1970, pp. 793-799.
 - 338. Silk, J.: The Diffuse X-Ray Background. Vol. 151, 1968, pp. L19-L22.
 - 339. Silk, J.: The Signature of a Pulsar on the Diffuse X-Ray Background. Vol. 166, 1971, pp. L39-L44.
 - 340. Silk, J. and Brown, R. L.: On the Ultraviolet Absorption-Line Spectra Produced by HI Regions. Vol. 163, 1971, pp. 495-502.
 - 341. Silk, J. and Werner, M. W.: Heating of HI Regions by Soft X-Rays. Vol. 158, 1969, pp. 185-192.
 - 342. Smith, L. F. and Aller, L. H.: On the Classification of Emission-Line Spectra of Planetary Nuclei. Vol. 157, 1969, pp. 1245-1254.
 - 343. Sofia, S.: Comments on Shklovsky's Model for the X-Ray Source Sco XR-1. Vol. 149, 1967, pp. L59-L60.
 - 344. Solinger, A. B.: A Blast-Wave Model for the Explosion in the Galaxy M82. Vol. 158, 1969, pp. L25-L30.
 - 345. Spitzer, Jr., L. and Saslaw, W. C.: On the Evolution of Galactic Nuclei. Vol. 143, 1966, pp. 400-419.

- 346. Spitzer, Jr., L. and Scott, E. H.: Heating of HI Regions by Energetic Particles. II. Integration Between Secondaries and Thermal Electrons. Vol. 158, 1969, pp. 161-171.
- 347. Starrfield, S. G.: The Rate of Mass Exchange in DQ Herculis. Vol. 161, 1970, pp. 361-363.
- 348. Stecker, F. W.: The Cosmic Gamma-Ray Spectrum from
 Secondary-Particle Production in the Metagalaxy. Vol. 157,
 1969, pp. 507-514.
- 349. Stecker, F. W. and Morgan, Jr., D. L.: Metagalactic Gamma Rays from Relativistic-Electron Bremsstrahlung Interactions. Vol. 171, 1972, pp. 201-207.
- 350. Steigman, G.; Werner, M. W. and Geldon, F. M.: Ionization Equilibrium of Interstellar Nitrogen: A Probe for the Intercloud Medium? Vol. 168, 1971, pp. 373-380.
- 351. Stein, W. A.: The Millimeter Radiation from 3C 273. Vol. 148, 1967, pp. 689-694.
- 352. Stepień, K.: Photoelectric Observations of Sco X-1. Vol. 151, 1968, pp. L15-L17.
- 353. Stief, L. J.; Donn, B.; Glicker, S.; Gentieu, E. P. and Mentall, J. E.: Photochemistry and Lifetimes of Interstellar Molecules. Vol. 171, 1972, pp. 21-30.
- 354. Sturrock, P. A.: A Model of Pulsars. Vol. 164, 1971, pp. 529-556.
- 355. Sturrock, P. A.: On the Possibility of Pulsar Action in Quasars. Vol. 170, 1971, pp. 85-92.
- 356. Tananbaum, H.; Gursky, H.; Kellogg, E. and Giacconi, R.: X-Ray Observations of GX 17+2 from Uhuru. Vol. 168, 1971, pp. L25-L28.
- 357. Tananbaum, H.; Kellogg, E.; Gursky, H.; Murray, S.; Schreier, E. and Giacconi, R.: Measurement of the Location of the X-Ray Sources Cygnus X-1 and Cygnus X-2 from Uhuru. Vol. 165, 1971, pp. L37-L41.
- 358. Tarter, C. B. and Salpeter, E. E.: The Interaction of X-Ray Sources with Optically Thick Environments. Vol. 156, 1969, pp. 953-966.

- 359. Tarter, C. B.; Tucker, W. H. and Salpeter, E. E.: The Interaction of X-Ray Sources with Optically Thin Environments. Vol. 156, 1969, pp. 943-951.
- 360. Taylor, J. H.; Huguenin, G. R. and Hirsch, R. M.:

 Search for Pulsed Radio Emission from Scorpius X-1
 and Cygnus X-1. Vol. 172, 1972, pp. L17-L19.
- 361. Thomas, R. M.; Buselli, G.; Clancy, M. C. and Davison, P. J. N.: Balloon Observations of a New-Born X-Ray Source. Vol. 158, 1969, pp. L151-L154.
- 362. Thomas, R. M.; Buselli, G.; Clancy, M. C. and Davison, P. J. N.: Erratum: "Balloon Observations of a New-Born X-Ray Source." Vol. 161, 1970, p. L155.
- 363. Toor, A.; Price, R.; Seward, F. and Scudder, J.: X-Ray Source Positions for Cygnus X-1, Cygnus X-2, and Cygnus X-3. Vol. 168, 1971, pp. L15-L16.
- 364. Toor, A.; Price, R. E. and Seward, F. D.: Limit on Line Emission in the Diffuse X-Ray Background. Vol. 172, 1972, pp. L73-L75.
- 365. Toor, A.; Seward, F. D.; Cathey, L. R. and Kunkel, W. E.:
 A Measurement of the Optical and X-Ray Emission from
 Scorpius X-1 and the X-Ray Diffuse Background. Vol. 160,
 1970, pp. 209-213.
- 366. Trimble, V. L. and Thorne, K. S.: Spectroscopic Binaries and Collapsed Stars. Vol. 156, 1969, pp. 1013-1019.
- 367. Tucker, W.: Cosmic X-Ray Sources. Vol. 148, 1967, pp. 745-765.
- 368. Tucker, W. H.: A Blast-Wave Model for the Vela X Supernova Remnant and the Origin of the Gum Nebula. Vol. 167, 1971, pp. L85-L87.
- 369. Tucker, W. H.: Physical Conditions in Sco X-1. Vol. 149, 1967, pp. L105-L109.
- 370. Tucker, W. H.: The X-Ray Emission from Supernova Outbursts and the Diffuse X-Ray Background. Vol. 161, 1970, pp. 1161-1163.
- 371. Tucker, W. H. and Gould, R. J.: Radiation from a Low-Density Plasma at 10⁶⁰ - 10⁸⁰K. Vol. 144, 1966, pp. 244-258.

- 372. Turnrose, B. E. and Rood, H. J.: On the Hypothesis that the Coma Cluster is Stabilized by a Massive, Ionized Intergalactic Gas. Vol. 159, 1970, pp. 773-789.
- 373. Usher, P. D.: Secular Behavior of a Blue Object Near Cygnus X-2. Vol. 149, 1967, pp. L19-L20.
- 374. Van Horn, H. M.; Richardson, M. B. and Hansen, C. J.:
 Radial Pulsations of Pre-White-Dwarf Stars. I. Linear
 Quasi-Adiabatic Analysis. Vol. 172, 1972, pp. 181-199.
- 375. Verma, S. D.: High Energy Electrons and Emission of the Omnidirectional Synchrotron Radiation in Radio-Frequency and X-Ray Regions. Vol. 152, 1968, pp. 537-544.
- 376. Vette, J. I.; Gruber, D.; Matteson, J. L. and Peterson, L. E.: A New Component of Cosmic Gamma Rays Near 1 MeV Observed by the ERS-18. Vol. 160, 1970, pp. L161-L170.
- 377. Visvanathan, N.: Polarization Observations in the Radio Galaxy 3C 371 and the X-Ray Source Cyg X-2. Vol. 150, 1967, pp. L149-L151.
- 378. Wade, C. M. and Hjellming, R. M.: Further Radio Observations of Scorpius X-1. Vol. 170, 1971, pp. 523-528.
- 379. Wade, C. M.; Hjellming, R. M.; Kellermann, K. I. and Wardle, J. F. C.: Radio Emission from the Nucleus of NGC 5128. Vol. 170, 1971, pp. L11-L13.
- 380. Wallerstein, G.: A Possible Identification of Lac XR-1 with the Wolf-Rayet Binary HD 211853. Vol. 151, 1968, pp. L121-L124.
- 381. Wallerstein, G. and Silk, J.: Interstellar Gas in the Direction of the Vela Pulsar. Vol. 170, 1971, pp. 289-296.
- 382. Webber, W. R. and Reinert, C. P.: Balloon-Borne Studies of X-Ray Emission from Selected Regions in the Northern Sky. Vol. 162, 1970, pp. 883-889.
- 383. Werner, M. W.; Silk, J. and Rees, M. J.: Heating of HI Regions by Soft X-Rays. II. The Effect of Galactic Soft X-Ray Sources. Vol. 161, 1970, pp. 965-977.
- 384. Westphal, J. A.; Sandage, A. and Kristian, J.: Rapid Changes in the Optical Intensity and Radial Velocities of the X-Ray Source Sco X-1. Vol. 154, 1968, pp. 139-156.

- 385. Weymann, R.: Possible Thermal Histories of Intergalactic Gas. Vol. 147, 1967, pp. 887-900.
- 386. Weymann, R.: The Energy Spectrum of Radiation in the Expanding Universe. Vol. 145, 1966, pp. 560-571.
- 387. Wilson, R. E.: A Model of Epsilon Aurigae. Vol. 170, 1971, pp. 529-539.
- 388. Wolf, R. A.: Some Effects of the Strong Interactions on the Properties of Neutron-Star Matter. Vol. 145, 1966, pp. 834-841.
- 389. Wolfe, A. M.: New Limits on the Shear and Rotation of the Universe from the X-Ray Background. Vol. 159, 1970, pp. L61-L67.
- 390. Wolfe, A. M.: Some Implications of the Anisotropy Measured in the Microwave Background. Vol. 156, 1969, pp. 803-813.
- 391. Wolfe, A. M. and Burbidge, G. R.: Discrete Source Models to Explain the Microwave Background Radiation. Vol. 156, 1969, pp. 345-371.
- 392. Wolff, R. S.; Angel, J.R.P.; Novick, R. and Vanden Bout, P.: Search for Polarization in the X-Ray Emission of the Crab Nebula. Vol. 160, 1970, pp. L21-L25.
- 393. Woltjer, L.: The Nature of Pulsating Radio Sources. Vol. 152, 1968, pp. L179-L180.
- 394. Woltjer, L.: X-Rays and Type I Supernova Remnants. Vol. 140, 1964, pp. 1309-1313.
- 395. Zeldovich, Ya. B. and Guseynov, O. H.: Collapsed Stars in Binaries. Vol. 144, 1966, pp. 840-841.

PART II

AUTHOR INDEX TO PART I

Ables, J. G. - 1

Acton, L. W. - 2, 101, 102, 103

Adams, D. J. - 67

Allen, R. J. -3

Aller, L. H. - 342

Anderson, K. - 225

Andrew, B. H. - 4, 5

Angel, J. R. P. - 6, 7, 210, 211, 226, 392

Arons, J. - 8, 9, 10, 11, 12

Arp, H. C. - 91

Bahcall, J. N. - 13, 14, 15

Baxter, A. J. - 16

Becklin, E. E. - 17, 18

Belian, R. D. - 19, 66, 85, 86

Berge, G. L. - 266

Berkey, G. - 329

Bingham, R. G. - 20

Blanco, V. - 21, 22, 23

Bleach, R. D. - 24, 180

Bleeker, J. A. M. - 25, 26

Bless, R. C. - 27

Blumenthal, G. R. - 28

Boldt, E. A. - 24, 29, 30, 31, 32, 33, 180, 181, 182, 299, 310

Bosh, H. E. - 167

Boughan, E. - 320

Bouigue, R. - 273

Bowyer, C. S. - 34, 35, 222, 223, 224, 225, 249, 250

Bradt, H. V. - 5, 23, 36, 37, 149, 150, 151, 219, 220, 255, 278, 296, 303, 316, 320

Brandt, J. C. - 38

Brecher, K. - 39, 40

Brini, D. - 41

Brown, R. L. - 42, 43, 340

Brucato, R. - 216

Bunner, A. N. - 44, 45, 46, 65, 256

Burbidge, E. M. - 47

Burbidge, G. R. - 48, 77, 141, 297, 391

Burger, J. J. - 25

Burginyon, G. A. - 49, 173, 291, 292, 327

Burnett, B. - 320

Buselli, G. - 75, 361, 362

Byram, E. T. - 111, 114, 172, 259

Campbell, D. B. - 300

Canuto, V. - 55

Carleton, N. P. - 183

Cathey, L. R. - 50, 365

Catura, R. A. - 2

Cavaliere, A. - 51, 52, 53

Chaisson, E. J. - 54

Chau, W. Y. - 169

Chitnis, E. V. - 301

Chiu, H. Y. - 55

Chodil, G. - 22, 56, 57, 58, 59, 326

Chubb, T. A. - 113, 171, 334

Ciriegi, U. - 41

Clancy, M. C. - 75, 361, 362

Clark, C. D. - 20

Clark, G. W. - 23, 60, 61, 232, 233, 234

Clayton, D. D. - 62, 63, 64

Cocke, W. J. - 211

Coleman, P. L. - 44, 45, 65, 256

Colgate, S. A. - 62, 299

Comella, J. M. - 300

Conner, J. P. - 19, 66, 85, 86

Cooke, B. A. - 67

Coppi, B. - 68, 69

Counselman III, C. C. - 300

Cox, D. P. - 70

Craddock, W. L. - 63

Craft, Jr., H. D. - 300

Cruddace, R. - 249, 250

Cudaback, D. D. - 215

Culhane, J. L. - 2

Cunningham, C. - 71

Daltabuit, E. - 70

Davidsen, A. - 112

Davidson, K. - 72, 73

Davison, K. - 74

Davison, P. J. N. - 75, 361, 362

De Mendonca, F. - 35

De Young, D. S. - 76

Deerenberg, A. J. M. - 25, 26

Demoulin, M. - 77, 213

Desai, U. D. - 29, 30

Dicke, R. H. - 78

Donn, B. - 353

Downs, G. S. - 79

Doxsey, R. - 304, 305, 306, 320

Drake, G. W. F. - 28

Eggen, O. J. - 80, 81, 82, 83

Elliot, J. L. - 84

Ellis, D. V. - 161, 162, 163, 164, 165

Ellis, G. F. R. - 160

Evans, W. D. - 19, 66, 85, 86

Fazio, G. G. - 87, 88

Feast, M. W. - 89

Feldman, P. A. - 169, 187

Felten, J. E. - 90, 91, 92, 93

Ferrari, A. - 68

Fichtel, C. E. - 94, 95, 96

Field, G. B. - 97, 98, 127

Finzi, A. - 99, 100

Fischel, D. - 27

Fisher, P. C. - 2, 101, 102, 103, 104, 105

Fishman, G. J. - 62, 106, 107, 108, 109, 161, 162, 163, 164, 165

Fowler, W. A. - 110

Freeman, K. C. - 81

Friedman, H. - 111, 112, 113, 114, 115, 171, 172, 259, 334, 335

Fritz, G. - 112, 113, 114, 115, 171, 172, 259, 334, 335

Frogel, J. A. - 17

Frye, Jr., G. M. - 116

Fujii, M. - 265

Fuligni, F. - 41

Garmire, G. P. - 60, 133, 149, 150, 151, 239, 278, 316

Gatewood, G. - 117

Gaustead, J. E. - 283

Gebel, W. L. - 118

Geldon, F. M. - 350

Gentieu, E. P. - 353

Giacconi, R. - 119, 120, 121, 122, 123, 131, 132, 134, 149, 150, 151, 152, 154, 156, 208, 209, 228, 278, 279, 316, 321, 322,

三级表 "会无,我是一点

356, 357

Glass, I. S. - 124, 235

Glenn, S. W. - 161, 162, 163, 164

Glicker, S. - 353

Goad, L. E. - 54

Goldreich, P. - 125

Goldsmith, D. W. - 126, 127, 157

Goldwire, Jr., H. C. - 128

Golson, J. C. - 199, 200, 201

Gordon, M. A. - 129, 130, 140

Gorenstein, P. - 119, 120, 121, 123, 131, 132, 133, 134, 135, 136, 137, 149, 150, 151, 152, 153, 155, 278, 279, 316

Goss, W. M. - 138

Gott III, J. R. - 139

Gottesman, S. T. - 130, 140

Gould, R. J. - 92, 141, 142, 143, 371

Grader, R. J. - 49, 144, 145, 146, 173, 174, 291, 292, 327

Graham, D. - 176

Grasdalen, G. - 224

Grayzeck, E. J. - 153

Green, D. W. - 16

Grindlay, J. E. - 147

Groves, D. J. - 71, 298

Gruber, D. - 376

Gunn, J. E. - 139, 148, 285

Gursky, H. - 119, 120, 121, 122, 123, 131, 132, 133, 134, 135, 136, 137 149, 150, 151, 152, 153, 154, 155, 156, 208, 209, 228, 278 279, 316, 321, 322, 356, 357 Guseynov, O. H. - 395

Guthrie, P. D. - 295

Habing, H. J. - 127, 157

Hansen, C. J. - 374

Harnden, Jr., F. R. - 107, 108, 109, 158, 166, 167, 204

Harrington, S. - 222

Harris, B. - 135

Hartle, J. B. - 159

Hartman, R. C. - 94

Harwit, M. - 184

Hawking, S. W. - 160

Hayes, J. E. - 50

Haymes, R. C. - 107, 108, 109, 158, 161, 162, 163, 164, 165, 166, 167, 204

Heiles, C. - 168

Helmken, H. F. - 87

Henriksen, R. N. - 169

Henry, R. C. - 98, 114, 115, 170, 171, 172, 259, 334

Hesser, J. E. - 227

Hill, R. W. - 49, 144, 145, 146, 173, 174, 291, 292, 327

Hillier, R. R. - 175

Hiltner, W. A. - 21, 22, 23, 49, 57, 86, 144, 145, 176, 220, 252,

253, 267

Hirsch, R. M. - 360

Hjellming, R. M. - 177, 178, 378, 379

Hoag, A. - 220

Hobbs, R. W. - 179

Holt, S. S. - 24, 29, 30, 31, 180, 181, 182

Horowitz, P. - 84, 183

Houck, J. R. - 184

Hoyle, F. - 185

Hudson, H. S. - 186, 324

Hughes, V. A. - 187

Huguenin, G. R. - 360

Hunter, C. - 188

Inman, C. L. - 189

Jackson, P. D. - 190

Jackson, W. R. - 175

Jacobson, A. S. - 294

Jayanthi, U. B. - 301, 302

Jenkins, E. B. - 191

Johnson, H. M. - 101, 192, 193, 194, 195, 196, 197, 198, 199, 200,

201, 202, 203, 264, 293

Johnson III, W. N. - 108, 109, 158, 167, 204.

Jones, F. C. - 205

Jones, T. W. - 206

Jordan, W. C. - 101, 102, 103

Jugaku, J. - 316

Julian, W. H. - 125

Kafatos, M. C. - 207

Kellermann, K. I. - 379

Kellogg, E. M. - 122, 123, 134, 136, 137, 154, 155, 156, 208, 209, 228,

279, 321, 322, 356, 357

Kellogg, P. J. - 206

Kerr, F. J. - 153, 190

Kestenbaum, H. - 7, 210, 211

Kiang, T. - 212

Kleinmann, D. E. - 17, 18

Kniffen, D. A. - 94, 95, 96

Kozlovsky, B. - 13

Kraft, R. P. - 213, 214

Kraus, J. D. - 4

Kraushaar, W. L. - 44, 45, 60, 65, 256

Krishnan, T. - 215

Kristian, J. - 216, 217, 218, 315, 384

Kunkel, W. E. - 21, 22, 23, 86, 219, 220, 365

Kurfess, J. D. - 161, 162, 163, 164, 165, 221

Kuvshinov, V. M. - 274

Lampton, M. - 35, 222, 223, 224, 225, 249, 250

Landstreet, J. D. - 226

Lanning, H. - 216

Lawrence, G. M. - 227

Leong, C. - 154, 156, 208, 228

Lerche, I. - 229, 230, 231.

Levinson, R. - 322

Lewin, W. H. G. - 61, 232, 233, 234, 235 236, 237, 238, 257

Liller, W. - 84

Loh, E. D. - 239

Ludden, D. J. - 176

Lynds, C. R. - 47, 91, 240, 241, 267

Lyngå, G. - 23, 82

MacGregor, A. - 242

Mack, J. E. - 35, 223

Macklin, R. L. - 243

Mahoney, W. - 225

Manchester, R. N. - 244

Manley, O. P. - 245, 246, 247, 248

Mannery, E. J. - 49, 57

Maran, S. P. - 241

Margon, B. - 223, 225, 249, 250

Marionni, P. - 179

Mark, H. - 22 56, 57, 58, 59, 71, 251, 252, 253, 326

Mathews, W. G. - 263

Matilsky, T. A. - 191

Matsuoka, M. - 265, 280

Matteson, J. L. - 376

May, T. C. - 254

Mayer, W. - 36, 255, 296, 303, 306, 320

McCammon, D. - 44, 45, 65, 256

McClintock, J. E. - 235, 236, 237, 238, 257

McCray, R. - 11, 12, 258

Meekins, J. F. - 112, 113, 114, 115, 171, 172, 259, 334, 335

Meidav, M. - 335

Meltzer, D. W. - 260

Mentall, J. E. - 353

Meyerott, A. J. - 101, 102, 103, 104, 105

Michel, F. C. - 128, 261, 262

Miller, J. S. - 214, 263

Minkowski, R. - 264

Miyamoto, S. - 265, 280

Moffet, A. T. - 266

Mook, D. E. - 176, 267, 268

Moretti, E. - 41

Morgan, Jr., D. L. - 349

Morrison, P. - 39, 51, 52, 93, 207, 317

Morton, D. C. - 191, 269

Mumford, G. S. - 270

Muranaka, N. - 280

Murray, A. - 175

Murray, S. - 154, 209, 357

Naranan, S. - 23, 36, 37

Neugebauer, G. - 17, 271

Ney, E. P. - 17, 272

Niel, M. - 273

Nikulin, N. S. - 274

Nishimura, J. - 265

Noerdlinger, P. D. - 275, 276, 277

Novick, R. - 7, 210, 211, 392

Oda, M. - 149, 150, 151, 265, 278, 279, 280, 316

O'Dell, C. R. - 281

Ogawara, Y. - 265, 280

Ögelman, H. B. - 95, 96

Ohta, S. - 265

Oke, J. B. - 271, 282

Olbert, S. - 248

Onyejuba, P. E. - 283

Orszag, S. A. - 284

Osawa, K. - 316

Osmer, P. - 119, 220, 316

Ostricker, J. P. - 227, 285

Overbeck, J. W. - 286, 287, 288

Pacini, F. - 51, 53, 73, 289, 290

Palmieri, T. M. - 46, 173, 291, 292, 327

可是由 医黄素基 并 医基二氏病 人名法兰克克

Papaliolios, C. - 84, 183

Peach, J. V. - 119

Peimbert, M. - 202, 293

Peterson, B. A. - 148

Peterson, L. E. - 186, 294, 324, 376

Pollack, J. B. - 295

Polucci, G. - 296

Pounds, K. A. - 67.

Prakasarao, A. S. - 301, 302

Prendergast, K. H. - 297

Price, R. E. - 49, 71, 251, 252, 253, 298, 363, 364

Prichard, H. M. - 167

Purton, C. R. - 5

Ramaty, R. - 299

Ramsay, W. - 142

Rankin, J. M. - 300

Rao, U. R. - 301, 302

Rappaport, S. - 5, 23, 36, 37, 220, 255, 296, 303, 304, 305, 306, 320

Redfern, R. M. - 175

Rees, M. J. - 14, 307, 308, 309, 383

Reeves, H. - 110

Reinert, C. P. - 382

Richards, D. W. - 300

Richardson, M. B. - 374

Ricker, G. R. - 238, 257

Riegler, G. R. - 310

Rieke, G. H. - 87, 311

Rodgers, A. W. - 83

Rodrigues, R. - 22, 49, 56, 57, 58, 59, 71, 251, 252, 253, 298

Roethig, D. T. - 102, 103

Rood, H. J. - 372

Roosen, R. G. - 38

Rose, W. K. - 312, 313

Ruderman, M. A. - 314

Ryckman, S. G. - 235, 236

Sale, R. G. - 175

Salpeter, E. E. - 13, 14, 73, 358, 359

Sandage, A. R. - 81, 119, 216, 217, 315, 316, 384

Sargent, W. L. W. - 282

Sartori, L. - 317

Saslaw, W. C. - 345

Scargle, J. D. - 318

Scheepmaker, A. - 25

Schild, R. E. - 319

Schnopper, H. W. - 5, 220, 320

Schreier, E. - 122, 208, 279, 321, 322, 357

Schroeder, D. - 220

Schwartz, D. A. - 24, 180, 186, 323, 324

Sciama, D. W. - 143, 307, 308

Scott, E. H. - 346

Scudder, J. - 363

Seielstad, G. A. - 325

Serlemitsos, P. J. - 24, 30, 31, 32, 33, 180, 181, 182, 310

Severny, A. B. - 274

Seward, F. D. - 22, 49, 56, 57, 144, 145, 173, 174, 242, 251, 252,

253, 291, 292, 298, 326, 327, 328, 363, 364, 365

Shaver, P. A. - 138

Shen, B. S. P. - 295

Shen, C. S. - 329

Shklovsky, I. S. - 330, 331

Shore, S. N. - 118

Shukla, P. G. - 332, 333

Shulman, S. - 334, 335

Silk, J. - 12, 40, 64, 110, 126, 299, 336, 337, 338, 339, 340, 341, 381, 383

Simon, M. - 309

Smith, L. F. - 342

Smith, M. - 220

Smith, W. B. - 61, 232, 233, 234, 235, 236, 237

Snellen, G. H. - 218

Sofia, S. - 117, 343

Solinger, A. B. - 344

Sommer, M. - 94

Spada, G. - 23, 36, 37, 278

Spiegel, E. A. - 314 Commonway and the common and the second seco

Spinrad, H. - 202, 293

Spitzer, Jr., L. - 345, 346

Sreekantan, B. V. - 149, 150, 151, 278, 316

智養工具有意思者 一切工具部外工

Starrfield, S. G. - 348

Stecker, F. W. - 88, 348, 359

Stecker, T. P. - 27

Steigman, G. - 350

Stein, W. A. - 92, 272, 351

Stephenson, C. B. - 203

Stepien, K. - 352

Stewardson, E. A. - 67

Stief, L. J. - 353

Stockton, A. N. - 47

Stoering, J. P. - 146, 173, 291, 292, 327

Strecker, D. W. - 17

Strong, I. B. - 86

Sturrock, P. A. - 354, 355

Swanenburg, B. N. - 25

Swift, C.D. - 22, 49, 56, 57, 58, 59, 71, 251, 252, 253, 298, 326

The state of the s

The state of the state of the

Tanaka, Y. - 25

Tananbaum, H. D. - 122, 123, 154, 156, 208, 209, 228, 279, 287

Tarter, C. B. - 358, 359

Taylor, B. J. - 202, 293

Taylor, J. H. - 360

Thomas, R. M. - 75, 361, 362

Thompson, A. R. - 79

Thorne, K. S. - 159, 260, 366

Toor, A. - 298, 326, 328, 363, 364, 365

Treeves, A. - 69

Trimble, V. L. - 366

Trumbo, D. E. - 241

Tucker, W. H. - 28, 74, 165, 359, 367, 368, 369, 370, 371

Turiel, I. - 57, 242

Turnrose, B. E. - 372

Usher, P. D. - 119, 373

Van Horn, H. M. - 374

Vanden Bout, P. - 392

Vedrenne, G. - 273

Verma, S. D.: - 375

Vespignani, G. - 41

Vette, J. I. - 376

Veverka, J. - 84

Visvanathan, N. - 216, 218, 377

Wada, M. - 265, 280

Waddington, C. J. - 254

Wade, C. M. - 177, 178, 378, 379

Wallerstein, G. - 57, 380, 381

Wang, C. P. - 116

Wardle, J. F. C. - 379

Waters, J. R. - 119, 120, 121, 149, 150, 151, 278, 316

MRR GARE A CELLER GROWN

The second with the second of the second

BATT OF BETTER TO SERVICE

1.7 46 4 3 3

医感染性 化硫酸银矿 化氯化 医电影电话

Watt, S. - 320

Webber, W. R. - 382

Weekes, T. C. - 87, 311

Weiler, K. W. - 325

Welch, J. - 224

Werner, M. W. - 341, 350, 383

Westphal, J. A. - 217, 218, 315, 384

Weymann, R. - 385, 386

Wilson, B. G. - 16, 332, 333

Wilson, R. E. - 387

Wolf, R. A. - 15, 100, 388

Wolfe, A. M. - 389, 390, 391

Wolff, R. S. - 392

Woltjer, L. - 393, 394

Womack, E. A. - 288

Wood, K. - 52

Woodsworth, A. - 187

Woolf, N. J. - 92

Wright, J. P. - 88

Zaumen, W. - 304, 305, 306

Zeldovich, Ya. B. - 395

Zisk, S. H. - 215

PART III

SUBJECT INDEX TO PART I

"A Search for Rapid Optical Oscillations in Scorpius XR-1": 222

absorption: 3, 191, 283, 303, 359 05 050 450 kp0 mase kg. 190 450 450

"Acceleration of Relativistic Particles in the Crab Nebula": 261

accretion: 330

"Activity in the Crab Nebula": 318

AG Dra: 201

AG Peg: 201

Airforce polar-orbiting satellite: 71

 α CMa: 367

angular size measurements: 149, 150, 296

Ara constellation source: 46

Ara X-1: 46, 75

"Baade's 'south preceding' star": 241

balloon experiments: 20, 25, 26, 41, 59, 61, 94, 95, 96, 107, 116,

124, 158, 161, 162, 163, 164, 166, 167, 175,

204, 221, 225, 232, 233, 234, 235, 236, 237,

238, 254, 257, 265, 273, 287, 288, 294, 310,

361, 362, 382

baryon star models: 189

 β^1 Scorpii: 191

binary nature of Cen X-3: 322

binary stars: 47, 297, 322, 366, 380, 387, 395

blackbody radiation: 39, 88, 160, 169

blackhole: 387 by blackhole: 16387

blast-wave model: 344

"Blue Objects Near Cen XR-2": 82

Bragg crystal spectrometer: 210

bremsstrahlung radiation from a hot plasma: 57

3C 9: 61

3C 10 (Tycho's SN): 325

3C 47: 61

3C 48: 61,116

3C 84: 112

3C 93: 61

3C 109: 77

3C 120: 77, 391

3C 147: 61

3C 245: 87

3C 273: 35, 36, 51, 87, 116, 135, 162, 208, 227, 274, 295, 309, 391

3C 345: 87

3C 358 (Kepler's SN): 325

3C 371: 77, 377

3C 390.3: 77

3C 403: 61

3C 443: 87

3C 446: 61

Carina region: 67

Cas A: 61, 137, 251, 254, 287, 288, 311, 325, 357

Cas B (SN 1572; Tycho's SN): 61, 382

Cassiopeia region: 134

Cen A (NGC 5128): 17, 35, 164, 208, 219, 225, 311, 379

Cen X-2: 22, 58, 67, 75, 81, 82, 83, 233, 237, 301, 342

Cen X-3: 84, 122, 242, 322

Cen X-4: 19, 85, 362

Centaurus source: 83, 361

central stars of planetary nebulae: 22, 227

Cep X-2: 251

Cet X-2: 332

Cetus region: 332

CH Cyg: 201

Cir X-1: 250

Circinus region: 250

clusters of galaxies: 337

collapsed stars: 68, 69, 366, 395

Coma cluster of galaxies: 92, 111, 126, 139,154, 170, 372

Coma X-1: 154

compact sources: 48, 51, 249

Compton scattering: 77, 311, 329, 375

cosmology: 39, 139

CP 1133: 116

CP 1919: 116, 125

Crab nebula (SN 1054; NGC 1952; M1; Tau A; Tau X-1): 3, 18, 29, 32, 61,

63, 74, 79, 87, 94,

105, 107, 111, 113,

116, 124, 136, 137,

144, 163, 165, 181, 215, 218, 242, 260, 261, 262, 269, 272, 278, 285, 295, 300, 303, 311, 317, 318, 325, 328, 331, 367, 392, 393, 394

Crab pulsar (NP 0532; NP 0531): 53, 108, 113, 125, 128, 175, 218, 221, 229, 241, 244, 290, 295, 300, 354

Crux source (GX 301-2): 236, 257

CTA 102: 61

Cyg A: 3, 116

Cygnus Loop (NGC 6960): 24, 118, 146

Cygnus region: 24, 25, 59, 61, 120, 121, 152, 161, 166, 273

Cyg X-1: 20, 24, 41, 56, 59, 61, 87, 102, 116, 119, 124, 131, 161, 180, 187, 216, 242, 251, 259, 265, 279, 280, 287, 288, 304, 305, 321, 335, 357, 360, 363, 382

Cyg X-2: 24, 41, 47, 50, 56, 61, 83, 119, 131, 177, 201, 213, 214, 217, 240, 259, 266, 287, 293, 297, 335, 357, 363, 373, 377, 382

Cyg X-3: 24, 61, 131, 161, 242, 287, 363

Cyg X-4: 24

Cyg X-5: 24

Cyg X-6: 65

δ Scorpii: 191

diffuse background: 9, 10, 11, 12, 16, 26, 29, 30, 32, 39, 40, 43, 44, 64, 67, 71, 88, 90, 93, 101, 106, 116, 136, 143,

gar to the contract of the con

160, 171, 172, 174, 185, 251, 256, 259, 292, 314, 323, 324, 326, 329, 332, 334, 338, 339, 341, 364, 365, 370, 375, 376, 389, 390

discrete source limits: 95

distribution of X-ray sources: 123, 134, 152, 196, 242, 255, 363

DQ Her: 312, 347

€ Aur: 387

ERS-18: 376

 η Car: 173, 258

"Evidence of High-Frequency Oscillations in the X-Ray Flux from

Scorpius X-1": 7

evolution of galactic nuclei: 345

flare observations: 186, 232, 233, 236, 257, 367

flare stars: 147

"Fossil Strömgren Spheres from Supernova Explosions": 207

Friedmann universe: 390, 391

galactic anticenter region: 29

galactic center region: 94, 95, 141, 163, 204, 209

galactic wakes: 314

galaxy formation: 40, 277

gamma radiation: 9, 10, 11, 12, 60, 62, 63, 64, 87, 88, 90, 93, 94,

95, 96, 106, 110, 116, 161, 164, 165, 166, 167, 175,

204, 221, 254, 273, 295, 311, 329, 349, 355, 376

γ₂ Vel: 27

gaseous nebula: 22

GCX: 209

GK Per 1901 (nova): 270

Gum nebula: 299, 368

GX 1+4: 238

GX 3+1: 5, 21, 23, 32, 37, 138, 163, 177, 199, 220, 238, 287, 320, 342

The property of the first property of the same of

GX 5-1: 5, 23, 37, 177, 220, 238, 320

GX 9+1: 5, 23, 37, 177, 220, 287, 296, 320

GX 9+9: 23, 37, 287

GX 13+1: 37

GX 17+2: 5, 23, 37, 220, 296, 320, 356

GX 263+3: 155

GX 301-2: 257

GX 340+0: 249, 306

GX 340-2: 46

GX 341-6: 46

GX 344+3: 46

GX 349+2: 296, 306

GX 359+2: 209

GX sources: 5, 23, 37, 46, 132, 138, 152, 155, 173, 177, 209, 220, 238, 249, 257, 287, 296, 303, 306, 320, 356, 382

HI regions: 336, 340, 341, 346, 383

HII regions: 192, 207

"H β Photometry of the Night Sky": 192

Harlo's violet galaxies: 212

HD 4174: 201

HD 45166: 199

HD 50896: 199

HD 211853: 380

HDE 310376: 319

heating: 12, 69, 127, 157, 299, 340, 341, 346

helium burning stars: 313

Her 1963 (nova): 270

"Hot, Vibrating Neutron Stars": 100

infrared radiation (IR): 17, 18, 179, 184, 271, 272, 344

intergalactic gas: 98, 276, 385, 389

intergalactic medium: 11, 12, 76, 92, 97, 98, 126, 141, 142, 148, 171, 172,

276, 307, 308, 314, 337, 386

intergalactic plasma: 172

"Interstellar Absorption of 10-A X-Rays": 303

interstellar gas: 127, 140, 190

interstellar grains: 286

interstellar medium: 32, 110, 129, 130, 157, 191, 299, 350, 381, 383

interstellar molecules: 353

interstellar reddening: 50

iron-line emission: 181

jets and filaments: 90, 212

K3-50: 54

Kepler's SN (SN 1604): 37, 325

Lac X-1: 380

Lemaître universe: 40

Leo X-1: 87

line radiation: 2, 13, 28, 30, 62, 115, 181, 182, 190, 258, 334, 336,

342, 364, 367, 371

LMC: 56, 228, 251, 298, 328

LMC X-1: 228

LMC X-2: 228

LMC X-3: 228

location measurements: 151, 265, 305, 306, 320, 356, 357

"Low-Energy Cosmic X-Rays": 332, 333

Lup X-1: 75, 233, 242

Lyman- α radiation (L α): 170, 191

M31: 61, 382

M82: 77, 87, 311, 344

M87: 3, 36, 38, 48, 77, 87, 90, 91, 116, 135, 162, 164, 208, 223, 287,

311, 382

magnetic fields: 246

mass accretion: 366

mass exchange: 347

mechanisms: 88, 141, 245, 248, 371

metagalaxy: 349

MH α 328-116: 201, 270

models: 28, 43, 51, 55, 69, 73, 90, 91, 93, 100, 118, 147, 159, 168, 169, 181, 189, 193, 194, 195, 206, 207, 229, 230, 231, 245, 248, 258, 261, 269, 275, 284, 285, 297, 299, 312, 313, 317, 330, 343, 344, 345, 351, 354, 358, 359, 367, 368, 369, 371, 372, 386, 387, 391

Monoceros Loop: 118

neutron binding energies: 243

neutron stars: 15, 99, 100, 125, 159, 169, 246, 249, 260, 269, 283, 284, 285, 330, 354, 366, 388

NGC 1068: 77, 274, 391

NGC 1275 (Per A): 112, 156, 311, 391

NGC 4151: 77, 87, 156, 274, 282, 391

NGC 5128 (Cen A): 17, 35, 208, 219, 225, 379

NGC 5189: 22, 342

NGC 6302: 264

NGC 6960: 118

NGC 7026: 342

NGC 7027: 263

nightsky emission: 184

"Non-Thermal Optical Radiation from Galaxies": 77

Norma source: 233

north galactic pole region: 171

North Polar Spur: 45

Nor X-1: 75

Nor X-2: 75, 233, 242

nova: 19, 203, 270, 312

NP 0531: 53

NP 0532 (Crab pulsar): 53, 107, 108, 109, 113, 128, 175, 221, 229, 241,

289, 290, 300, 331, 354

N-type galaxies: 77

nucleosynthesis: 64

O association: 281

"Of and Wolf-Rayet Stars as X-Ray Sources": 27

Of stars: 27

"On the Binary Nature of Cyg X-2": 47

"On the Photoionization of Hydrogen and Helium": 42

"On the Time Dependence of Emission-Line Strengths from a Photoionized

Nebula": 13

optical identification of Cyg X-1: 216

optical identification of NP 0532: 241

optical identification of Sco X-1: 203, 316

optical search: 23, 84, 119, 220

optically thick environment: 358

optically thin environment: 359

Orion region: 67

OSO-III: 60, 95, 186, 323, 324

particle acceleration: 90

peculiar objects: 274

Per A: 112

Per X-1: 112

periodicity: 304, 306, 335

"Photoelectric Observations of Sco X-1": 352

"Photoelectric Scanner Spectrophotometry of Cyg X-2": 293

"Photoelectric Scanner Spectrophotometry of Sco X-1": 202

photoionization: 42, 72, 194

 π Sco association: 281

 π Scorpii: 191

PKS 1116 + 12: 275

planetary nebula: 97, 263, 274, 342

plasma: 253

polarization: 6, 79, 176, 218, 226, 274, 325, 377, 392

April of the state of the

positional correlation: 281

p-process abundances: 243

pre-white dwarfs: 374

protogalaxies: 8

PSR 0833: 290

PSR 0833-45: 299, 381

pulsars: 14, 53, 55, 68, 73, 116, 125, 158, 183, 229, 230, 231, 241,

285, 290, 295, 300, 331, 339, 354, 355, 381

pulsating source: 107, 122, 180, 250, 279, 321, 393

Pup A: 291, 327

QSO: 8, 52, 61, 72, 77, 87, 116, 206, 274, 275, 276, 277, 295, 309,

355

quiet Sun: 75

radial pulsations of stars: 260

radial velocities: 89

radiative cooling: 70

radiative transfer: 9, 10, 129, 239

radio radiation: 1, 5, 79, 129, 130, 138, 177, 178, 179, 187, 190, 215, 244, 266, 300, 309, 325, 351, 360, 375, 378,

379, 393

radio recombination lines: 140

"Radio Sources with Flat Spectra": 4

"Radioactivity in Supernova Remnants": 63

"Rapid Changes in the Optical Intensity and Radial Velocities of the X-Ray Source Sco.X-1": 384

"Rapid Photometric and Spectroscopic Variation of the X-Ray Source Cyg X-2": 217

rocket experiments: 2, 16, 24, 29, 30, 31, 35, 36, 37, 44, 45, 46, 56,

57, 58, 65, 67, 75, 101, 102, 103, 105, 111, 112,

113, 114, 115, 120, 131, 132, 133, 134, 135, 136,

137, 146, 149, 151, 152, 153, 154, 155, 171, 172,

173, 174, 180, 182, 184, 191, 210, 211, 223, 225,

242, 249, 250, 251, 255, 256, 259, 278, 291, 292,

296, 298, 301, 302, 303, 304, 305, 306, 326,327,

328, 332, 335, 351, 363, 364, 365, 392

\$5003 Cen: 83, 89

Sag X-1: 163

Sagittarius region: 21, 23, 37, 163, 209, 255, 287, 296, 303, 320

Sagittarius-Scorpio Cluster: 131, 303

satellites: 19, 60, 66, 71, 85, 86, 122, 123, 154, 156, 186, 208,

209, 228, 279, 280, 321, 322, 323, 324, 356, 357, 376

"Scatter-Hole Cameras for X-Rays and Gamma Rays": 78

scattering: 286

Sco X-1: 1, 2, 13, 31, 37, 49, 56, 57, 60, 66, 67, 69, 73, 80, 83,

86, 101, 102, 111, 114, 115, 117, 123, 131, 144, 149, 150,

151, 152, 167, 174, 176, 178, 181, 186, 191, 193, 194, 195,

197, 200, 202, 203, 210, 222, 224, 226, 227, 232, 233, 234,

235, 239, 242, 245, 247, 248, 252, 259, 266, 267, 268, 270,

271, 274, 287, 294, 297, 301, 302, 303, 315, 316, 319, 330,

343, 351, 352, 355, 357, 360, 365, 367, 369, 378, 382, 384

Sco X-2: 46, 102, 242, 264

Sco X-3: 102

Sco X-4: 75, 102

Scorpio region: 152, 303

Scorpius-Centaurus association: 80, 117

Scorpius source: 101, 269

search for optical pulsars: 183

"Secular Behavior of a Blue Object Near Cygnus X-2": 373

Ser X-1: 41, 61, 242, 287

Ser X-2: 242

Seyfert galaxies: 77, 112, 156, 206, 274, 282, 391

Sgr X-1: 310

shear and rotation of the universe: 389

Shklovsky's model: 343

simultaneous observations: 49, 57, 86, 144, 145, 186, 211, 224, 253,

351, 365

sky near Sco X-1: 197, 198

SMC: 56, 228, 251, 256, 298

SMC X-1: 228

SN 1572 (Tycho's SN; Cas B): 137, 288, 382

SN 1604 (Kepler's SN): 37

solar X-rays: 32, 71

"Some Implications of the Anisotropy Measured in the Microwave

Background": 390

space-time singularities: 160

spectra: 56, 57, 103, 131, 133, 258, 259, 283, 284, 340, 342, 371

spectroscopic binaries: 366

spectroscopic complexities of Cyg X-2: 213

spectroscopic observations of Cyg X-2: 214, 240

spectroscopic observations of HDE 310376: 319

"Spectroscopic Observations of Scorpius X-1": 267

"Spectrum of an Ultraviolet Object in Sagittarius": 21

star clusters: 367

statistical fluctuations: 34, 104

steady-state universe: 391

stellar wind: 194

Sun: 116

supermassive stars: 159

supernova: 37, 53, 62, 63, 118, 134, 137, 146, 168, 207, 254, 291,

295, 299, 325, 339, 368, 370, 381, 394

suprathermal proton bremsstrahlung: 32, 33, 43, 205

synchrotron radiation: 3, 77, 375

Tau A: 3

Tau X-1: 29, 56, 61, 67, 111, 124, 242, 301, 303, 310, 325, 392

temporal behavior: 31, 287, 304

"The Analysis of X-Ray Spectra": 133

"The Estimated Distance to Cygnus X-1 Based on Its Low-Energy X-Ray

Spectrum": 153

"The Dynamics of Extended Extragalactic Radio Sources": 76

"The Recent Appearance of a New Source in the Southern Sky": 66

"The Rotation and Angular Momentum of Galaxies": 188

"Thermal Instability": 97

thermal X rays: 69, 317

Thomson scattering: 6

Tycho's SN (SN 1572): 137, 207, 325, 382

UBV photometry: 199, 200, 201, 219, 268, 315, 319

Uhuru (SAS-A): 122, 123, 154, 156, 208, 209, 228, 279, 280, 321, 322,

356, 357

ultraviolet absorption-line spectra: 340

Upper Scorpius Complex: 80

UV Ceti: 147

variability: 131, 177, 223, 228, 235, 237, 238, 265, 301, 309

CHARLES AND AREA OF THE THE

Vel X-1: 27, 56, 155

Vel X-2: 144, 381

Vela pulsar (PSR 0833): 158, 290, 295, 299, 381

Vela region: 327, 381

Vela satellites: 19, 66, 85, 86

Vela source: 155

Vela X: 207, 291, 299, 327, 368

Vir A: 3, 61, 90

Vir X-1 (M87): 223

Virgo cluster: 208

Virgo region: 94, 95, 135, 162

Weizsäcker-Williams method: 205

white dwarfs: 187, 227, 347

Wolf-Rayet stars: 27, 199, 342, 380

WX Cen: 81, 83

ζ Pup: 27

APPENDIX A

VOLUME - PAGE BIBLIOGRAPHY

THE ASTROPHYSICAL JOURNAL

1963

Vol. 137: X-Rays from Outside the Solar System — F. Hoyle. pp. 993-995.

Vol. 138: X-Rays from the Galactic Center, External Galaxies, and the Intergalactic Medium — R. J. Gould and G. R. Burbidge. pp. 969-977.

1964

Vol. 139: Stellar X-Ray Emission — P. C. Fisher and A. J. Meyerott. pp. 123-142.

Neutron Stars as a Possible Source of X-Rays from Outside the Solar System — A. Finzi, pp. 1398-1399.

Vol. 140: Neutron Stars as X-Ray Sources — D. C. Morton. pp. 460-469.

Supernova Shells and Galactic X-Rays — C. Heiles. pp. 470-476.

An Alternate Interpretation of the Paper "Stellar X-Ray Emission," by P. C. Fisher and A. J. Meyerott — S. Bowyer. pp. 820-821.

Reply to Letter of Stuart Bowyer — P. C. Fisher and A. J. Meyerott. pp. 821-823.

Free-Free Emission by Intergalactic Hydrogen — G. B. Field and R. C. Henry. pp. 1002-1012.

X-Rays and Type I Supernova Remnants — L. Woltjer. pp. 1309-1313.

Cosmic X- and Infrared Rays as Tools for Exploring the Large-Scale Structure of the Universe — R. J. Gould and D. W. Sciama. pp. 1634-1636.

Vol. 141: Baryon Star Models — C. L. Inman. pp. 187-194.

Small-Angle Scattering of Celestial X-Rays by Interstellar Grains - J. W. Overbeck. pp. 864-866.

Vol. 142: Radioactivity in Supernova Remnants — D. D. Clayton and W. L. Craddock. pp. 189-200.

Neutron-Star Atmosphers - S. A. Orszag. pp. 473-478.

Thermal Instability — G. B. Field. pp. 531-567.

37.5

An Observational Test of Theories of Neutron-Star Cooling - J. N. Bahcall and R. A. Wolf. pp. 1254-1256.

On the Density of Neutral Hydrogen in Intergalactic Space — J. E. Gunn and B. A. Peterson. pp. 1633-1636.

1966

1. 大学技术型 [Dec.]

Vol. 143: Observations of Cosmic X-Rays — P. C. Fisher; H. M. Johnson; W. C. Jordan; A. J. Meyerott and L. W. Acton. pp. 203-217.

The Distribution of X-Ray Sources in the Galaxy — H. M. Johnson. pp. 261-263.

On the Evolution of Galactic Nuclei - L. Spitzer, Jr. and W. C. Saslaw. pp. 400-419.

Vol. 144: Radiation from a Low-Density Plasma at 10^{60} - 10^{80} K - W. H. Tucker and R. J. Gould. pp. 244-258.

The Temperature of Intergalactic Matter — R. J. Gould and W. Ramsay. pp. 587-598.

Cosmic Black-Body Radiation, High-Energy Electrons, and the Origin of Isotropic X-Ray and Gamma Radiation — G. G. Fazio; F. W. Stecker and J. P. Wright. pp. 611-614.

Free-Free Emission as a Source of Galactic X-Rays — O. P. Manley. pp. 628-634.

The Sky Near the Brightest X-Ray Source in Scorpius — H. M. Johnson. pp. 635-638.

Collapsed Stars in Binaries — Ya. B. Zeldovich and O. H. Guseynov. pp. 840-841.

A Measurement of the Angular Size of the X-Ray Source Sco X-1 — H. Gursky; R. Giacconi; P. Gorenstein; J. R. Waters; M. Oda; H. Bradt; G. Garmire and B. V. Sreekantan. pp. 1249-1252.

X-Ray Emission from Sco X-1 - 0. P. Manley. pp. 1253-1257.

Vol. 145: The Kinetic Temperature and Ionization Level of Intergalactic Hydrogen in a Steady-State Universe — M. J. Rees and D. W. Sciama. pp. 6-20.

Normal Modes of Radial Pulsation of Stars at the End Point of Thermonuclear Evolution — D. W. Meltzer and K. S. Thorne. pp. 514-543.

The Energy Spectrum of Radiation in the Expanding Universe — R. Weymann. pp. 560-571.

Some Effects of the Strong Interactions on the Properties of Neutron-Star Matter — R. A. Wolf. pp. 834-841.

The Spectrum of Scorpius XR-1 to 50 keV — L. E. Peterson and A. S. Jacobson. pp. 962-965.

Erratum: "A Measurement of the Angular Size of the X-Ray Source Sco X-1" — H. Gursky; R. Giacconi; P. Gorenstein; J. R. Waters; M. Oda; H. Bradt; G. Garmire and B. V. Sreekantan. p. 968.

Vol. 146: A Measurement of the Location of the X-Ray Source Sco X-1 — H. Gursky; R. Giacconi; P. Gorenstein; J. R. Waters; M. Oda; H. Bradt; G. Garmire and B. V. Sreekantan. pp. 310-316.

On the Optical Identification of Sco X-1 — A. R. Sandage; P. Osmer; R. Giacconi; P. Gorenstein; H. Gursky; J. Waters; H. Bradt; G. Garmire; B. V. Sreekantan; M. Oda; K. Osawa and J. Jugaku. pp. 316-322.

A Possible Old Nova Near Sco X-1 — H. M. Johnson and G. B. Stephenson. pp. 602-605.

Ommidirectional Inverse Compton and Synchrotron Radiation from Cosmic Distributions of Fast Electrons and Thermal Photons — J. E. Felten and P. Morrison. pp. 686-708.

X-Rays from the Coma Cluster of Galaxies — J. E. Felten; R. J. Gould; W. A. Stein and N. J. Woolf. pp. 955-958.

Physical Characteristics of Sco X-1 — H. M. Johnson. pp. 960-961.

Three-Color Observations of Scorpius X-1, Nova Herculis 1963, Nova GK Persei 1901, and MH α 328-116 — G. S. Mumford. pp. 962-964.

1967

Vol. 147: The Detection of Heavy Elements in Intergalactic Space — M. J. Rees and D. W. Sciama. pp. 353-356.

Balloon Observation of the X-Ray Sources in the Cygnus Region in the Energy Range 20-130 keV — J. A. M. Bleeker; J. J. Burger; A. J. M. Deerenberg; A. Scheepmaker; B. N. Swanenburg and Y. Tanaka. pp. 391-394.

X-Rays from the Coma Cluster of Galaxies — H. Friedman and E. T. Byram. pp. 399-401.

The Electromagnetic Spectrum of Eta Carinae — R. McCray. pp. 544-555.

Absorption Lines in Neutron - Star Spectra — P. E. Onyejuba and J. E. Gaustad. pp. 806-808.

Problems Relating to Magnetic Fields in Neutron Stars — 0. P. Manley. pp. 808-810.

Positional Correlations of Galactic Objects and X-Ray Sources—C. R. O'Dell. pp. 855-857.

Possible Thermal Histories of Intergalactic Gas — R. Weymann. pp. 887-900.

X-Ray Spectra of Several Cosmic Sources — P. C. Fisher; W. C. Jordan; A. J. Meyerott; L. W. Acton and D. T. Roethig. pp. 1209-1213.

Physical Characteristics of Sco X-1. II. — H. M. Johnson. pp. 1213-1218.

Vol. 148: The Peculiar Nebula NGC 6302 — R. Minkowski and H. M. Johnson. pp. 659-662.

The Millimeter Radiation from 3C 273—W. A. Stein. pp. 689-694.

Cosmic X-Ray Sources - W. Tucker. pp. 745-765.

On the Nature of the Source of X-Ray Emission of Sco XR-1—I. S. Shklovsky. pp. L1-L4.

The Size and Position of the X-Ray Source in the Crab Nebula — M. Oda; H. Bradt; G. Garmire; G. Spada; B. V. Sreekantan; H. Gursky; R. Giacconi; P. Gorenstein and J. R. Waters. pp. L5-L11.

On the Polarization of Sco X-1 — W. A. Hiltner; D. E. Mook; D. J. Ludden and D. Graham. pp. L47-L48.

An X-Ray Survey of the Cygnus Region — R. Giacconi; P. Gorenstein; H. Gursky and J. R. Waters. pp. L119-L127.

On the Optical Search for the X-Ray Sources Cyg X-1 and Cyg X-2 — R. Giacconi; P. Gorenstein; H. Gursky; P. D. Usher; J. R. Waters; A. Sandage; P. Osmer and J. V. Peach. pp. L129-L132.

Ultrashort-Period Stellar Oscillations. I. Results from White Dwarfs, Old Novae, Central Stars of Planetary Nebulae, 3C 273, and Scorpius XR-1 — G. M. Lawrence; J. P. Ostriker and J. E. Hesser. pp. L161-L163.

Vol. 149: Cosmic X-Ray Sources in the 20-180 keV Energy Range D. Brini; U. Ciriegi; F. Fuligni; E. Moretti and G. Vespignani. pp. 429-433.

Secular Behavior of a Blue Object Near Cygnus X-2 -- P. D. Usher. pp. L19-L20.

Spectroscopic Observations of Cyg X-2 — C. R. Lynds. pp. L41-L43.

Photoelectric Scanner Spectrophotometry of Sco X-1—H. M. Johnson; H. Spinrad; B. J. Taylor and M. Peimbert. pp. L45-L50.

Comments on Shklovsky's Model for the X-Ray Source Sco XR-1 - S. Sofia. pp. L59-L60.

R. Giacconi; P. Gorenstein; H. Gursky and J. R. Waters. pp. L85.

Physical Conditions in Sco X-1 — W. H. Tucker. pp. L105-L109.

Vol. 150: High-Energy X-Rays from Cygnus XR-1 — J.W. Overbeck; E. A. Womack and H. D. Tananbaum. pp. 47-56.

X-Ray Intensities and Spectra from Several Cosmic Sources — G. Chodil; H. Mark; R. Rodrigues; F. D. Seward and C. D. Swift. pp. 57-65.

The Crab Nebula at 1420 MHz — T. Krishnan; S. H. Zisk and D. D. Cudaback. pp. 67-77

Pulsational Instability in Helium Shell-Burning Stars — W. K. Rose. pp. 193-202.

Thermal X-Rays from Non-Thermal Radio Sources — L. Sartori and P. Morrison. pp. 385-403.

Search for 8-80 keV X-Rays from the Large Magellanic Cloud and the Crab Nebula — F. D. Seward and A. Toor. pp. 405-411.

Diffuse Cosmic X-Ray Background Between 4 and 40 keV — F. Seward; G. Chodil; H. Mark; C. Swift and A. Toor. pp. 845-850.

UBV Photometry of Sco XR-1 - D. E. Mook. pp. L25-L30.

Jets and Filaments in Haro's Violet Galaxies — T. Kiang. pp. L31-L32.

Cosmology, Black-Body Radiation, and the Diffuse X-Ray Background — K. Brecher and P. Morrison. pp. L61-L64.

The Distribution of Galactic X-Ray Sources from Scorpio to Cygnus — H. Gursky; P. Gorenstein and R. Giacconi. pp. L75-L84.

The Spectra of Several X-Ray Sources in Cygnus and Scorpio — P. Gorenstein; R. Giacconi and H. Gursky. pp. L85-L94.

On the Binary Nature of Cyg X-2 — E. M. Burbidge; C. R. Lynds and A. N. Stockton. pp. L95-L97.

Rapid Photometric and Spectroscopic Variations of the X-Ray Source Cyg X-2 — J. Kristian; A. Sandage and J. A. Westphal. pp. L99-L105.

Polarization Observations in the Radio Galaxy 3C 371 and the X-Ray Source Cyg X-2 — N. Visvanathan. pp. L149-L151.

Spectral Data on Sco X-1 in the Energy Range from 20 to 100 keV — W. H. G. Lewin; G. W. Clark and W. B. Smith. pp. L153-L155.

On the Remarkable Spectroscopic Complexities of Cyg X-2-R. P. Kraft and M. Demoulin. pp. L183-L188.

A Cosmic X-Ray Survey in the Southern Hemisphere

B. A. Cooke; K. A. Pounds; E. A. Stewardson and

D. J. Adams. pp. L189-L191.

Evidence for X-Radiation from the Radio Galaxy M87—H. Bradt; W. Mayer; S. Naranan; S. Rappaport and G. Spada. pp. L199-L206.

1968

Vol. 151: Observations of Galactic X-Ray Sources — P. C. Fisher; W. C. Jordan; A. J. Meyerott; L. W. Acton and D. T. Roethig. pp. 1-19.

Sky Survey of High-Energy Cosmic X-Rays and Spectra of the Sources in the Crab Nebula and Cygnus — G. W. Clark; W. H. G. Lewin and W. B. Smith. pp. 21-32.

The Nucleus of the Seyfert Galaxy NGC 4151 - J. B. Oke and W. L. W. Sargent. pp. 807-823.

The Radiation and Physical Properties of the M87 Jet — J. E. Felten. pp. 861-879.

Cosmic Gamma Rays from Inverse Compton Scattering — C. S. Shen and G. Berkey. pp. 895-900.

Observation of the Cygnus Region with a Balloon-Borne X-Ray Detector — G. Chodil; H. Mark; R. Rodrigues and C. D. Swift. pp. L1-L3.

Observation of Gamma Radiation from the Crab Nebula — R. C. Haymes; D. V. Ellis; G. J. Fishman; J. D. Kurfess and W. H. Tucker. pp. L9-L14.

Photoelectric Observations of Sco X-1 - K. Stepien. pp. L15-L17.

The Diffuse X-Ray Background — J. Silk. pp. L19-L22.

On the Nature of Some Galactic X-Ray Sources — K. H. Prendergast and G. R. Burbidge. pp. L83-L88.

Interstellar Reddening in the Field of Cyg X-2 - L. R. Cathey and J. E. Hayes. pp. L89-L92.

Photoelectric Scanner Spectrophotometry of Cyg X-2—M. Peimbert; H. Spinrad; B. J. Taylor and H. M. Johnson. pp. L93-L97.

Of and Wolf-Rayet Stars as X-Ray Sources - R. C. Bless; D. Fischel and T. P. Stecher. pp. L117-L119

A Possible Identification of Lac XR-1 with the Wolf-Rayet Binary HD 211853 — G. Wallerstein. pp. L121-L124.

Detection of Gamma Radiation from the Cygnus Region — R. C. Haymes; D. V. Ellis; G. J. Fishman; S. W. Glenn and J. D. Kurfess. pp. L125-L129.

Detection of Hard X-Radiation from Virgo — R. C. Haymes; D. V. Ellis; G. J. Fishman; S. W. Glenn and J. D. Kurfess. pp. L131-L134.

Vol. 152: The Cosmic Black-Body Radiation and the Existence of Singularities in Our Universe — S. W. Hawking and G. F. R. Ellis. pp. 25-36.

A Model for the Nova Outburst — W. K. Rose. pp. 245-253.

High Energy Electrons and Emission of the Omnidirectional Synchrotron Radiation in Radio-Frequency and X-Ray Regions — S. D. Verma. pp. 537-544.

Celestial Positions of X-Ray Sources in Sagittarius — H. Bradt; S. Naranan; S. Rappaport and G. Spada. pp. 1005-1013.

An Optical Search for X-Ray Sources in Sagittarius — V. Blanco; W. Kunkel; W. A. Hiltner; G. Lynga; H. Bradt; G. Clark; S. Naranan; S. Rappaport and G. Spada. pp. 1015-1017.

Observations of the Crab Nebula at $\lambda = 5800$ Å, 2.2 μ , and 3.5 μ with a 4-Minute Beam — E. P. Ney and W. A. Stein. pp. L21-L24.

Infrared Observations of the Crab Nebula — E. E. Becklin and D. E. Kleinmann. pp. L25-L30.

Nova-Like Behavior of the X-Ray Source Centaurus XR-2 — G. Chodil; H. Mark; R. Rodrigues and C. D. Swift. pp. L45-L48.

Observation of Cen XR-2 and Other High-Energy X-Ray Sources in the Southern Sky — W. H. G. Lewin; G. W. Clark and W. B. Smith. pp. L49-L53.

Observation of an X-Ray Flare from Sco X-1 — W. H. G. Lewin; G. W. Clark and W. B. Smith. pp. L55-L61.

The Distribution of Polarization in the Crab Nebula at a Wavelength of 9.8 cm -G. S. Downs and A. R. Thompson. pp. L65-L69.

Spectrum of the Central Star in NGC 5189 — V. Blanco; W. Kunkel; W. A. Hiltner; G. Chodil; H. Mark; R. Rodrigues; F. Seward and C. D. Swift. pp. L135-L136.

Spectrum of an Ultraviolet Object in Sagittarius — V. Blanco; W. Kunkel and W. A. Hiltner. p. L137.

Evidence for Relativistic Expansion in Variable Radio Sources — M. J. Rees and M. Simon. pp. L145-L148.

The Nature of Pulsating Radio Sources — L. Woltjer. pp. L179-L180.

Vol. 153: Narrow-Band and UBV Photometry of Sco X-1 — H. M. Johnson and J. C. Golson. pp. 307-312.

The Absorption of Non-Thermal Radio Radiation in Thermal X-Ray Sources — R. J. Allen. pp. 389-396.

Slowly Rotating Relativistic Stars. II. Models for Neutron Stars and Supermassive Stars — J. B. Hartle and K. S. Thorne. pp. 807-834.

Hot, Vibrating Neutron Stars — A. Finzi and R. A. Wolf. pp. 835-848.

The Analysis of X-Ray Spectra — P. Gorenstein; H. Gursky and G. Garmire. pp. 885-897.

Time Variations in Scorpius X-1 and Cygnus XR-1 — J. W. Overbeck and H. D. Tanabaum. pp. 899-908.

Attempts to Detect Radio Emission from Two Galactic X-Ray Sources — A. T. Moffet and G. L. Berge. pp. 997-1000.

Possible Detection of a Dense Intergalactic Plasma — R. C. Henry; G. Fritz; J. F. Meekins; H. Friedman and E. T. Byram. pp. L11-L18.

A Comparison of the X-Ray Spectra from Tau XR-1 and the Vicinity of Sgr XR-1—G. R. Riegler, E. Boldt and P. Serlemitsos. pp. L95-L99.

Scatter-Hole Cameras for X-Rays and Gamma Rays — R. H. Dicke. pp. L101-L106.

Blue Objects Near Cen XR-2 — 0. J. Eggen and G. Lynga. pp. L195-L197.

Soft X-Rays from Scorpius XR-1 — G. Fritz, J. F. Meekins; R. C. Henry; E. T. Byram and H. Friedman. pp. L199-L202.

Observation of High-Energy Cosmic Gamma Rays — G. W. Clark; G. P. Garmire and W. L. Kraushaar. pp. L203-L207.

Vol. 154: Non-Thermal Optical Radiation from Galaxies — M. Demoulin and G. R. Burbidge. pp. 3-20.

Rapid Changes in the Optical Intensity and Radial Velocities of the X-Ray Source Sco X-1 — J. A. Westphal; A. Sandage and J. Kristian. pp. 139-156.

Simultaneous Observations of the Optical and X-Ray Spectra of Sco XR-1—G. Chodil; H. Mark; R. Rodrigues; F. D. Seward; C. D. Swift; I. Turiel; W. A. Hiltner; G. Wallerstein and E. J. Mannery. pp. 645-654.

The Soft X-Ray Spectrum of Sco XR-1 — R. W. Hill; R. J. Grader and F. D. Seward. pp. 655-660.

One-Dimensional Polarization Distributions Over Four Supernova Remnants at 1418 MHz — G. A. Seielstad and K. W. Weiler. pp. 817-832.

Physical Characteristics of Sco X-1. III — H. M. Johnson. pp. 1139-1141.

On the Optical Identification of the X-Ray Source Cen XR-2 as WX Cen - 0. J. Eggen, K. C. Freeman and A. Sandage. pp. L27-L31.

Physical Characteristics of Sco X-1 — G. Gatewood and S. Sofia. pp. L69-L70.

The Location of the X-Ray Source in Vela — H. Gursky; E. M. Kellogg and P. Gorenstein. pp. L71-L74.

A Radio Source Near the X-Ray Source GX3+1 - W. M. Goss and P. A. Shaver. pp. L75-L76.

Narrow-Band and UBV Photometry of GX3+1 and Two Wolf-Rayet Stars — H. M. Johnson and J. C. Golson. pp. L77-L82.

A Search for Discrete Sources of Cosmic Gamma Rays of Energies Near 2 x 10^{12} eV — G. G. Fazio; H. F. Helmken; G. H. Rieke and T. C. Weekes. pp. L83-L89.

Iron Line Emission from X-Ray Sources — S. S. Holt; E. A. Boldt and P. J. Serlemitsos. pp. L137-L140.

1969

Vol. 155: A Study of Visual and Infrared Observations of Sco XR-1 — G. Neugebauer and J. B. Oke. pp. 1-9.

Gamma-Ray Lines from Young Supernova Remnants — D. D. Clayton; S. A. Colgate and G. J. Fishman. pp. 75-82.

Production of Cosmic Gamma Rays by Compton Scattering in Discrete Sources — G. H. Rieke and T. C. Weekes. pp. 429-437.

Possible Time Variation of the Radio Emission from Sco X-1 — J. G. Ables. pp. L27-L30.

Search for Gamma Radiation from Centaurus A — R. C. Haymes; D. V. Ellis; G. J. Fishman; S. W. Glenn and J. D. Kurfess. pp. L31-L34.

Narrow-Band Photometry of Five Combinations - Variable Stars and the X-Ray Source Cyg X-2 — H. M. Johnson and J. C. Golson. pp. L91-L96.

Optical Identification and Observations of the Pulsar NP 0532 — R. Lynds; S. P. Maran and D. E. Trumbo. pp. L121-L125.

Detection of X-Rays from the Large Magellanic Cloud—H. Mark; R. Price; R. Rodrigues; F. D. Seward and C. D. Swift. pp. L143-L144.

The Diffuse X-Radiation Spectrum Below 4 keV — A. J. Baxter; B. G. Wilson and D. W. Green. pp. L145-L148.

Further Spectroscopic Observations of the Optical Object Identified with X-Ray Source Cygnus X-2 — R. P. Kraft and J. S. Miller. pp. L159-L161.

Vol. 156: The Spectrum of Diffuse Cosmic X-Rays, 1-13 keV — P. Gorenstein; E. M. Kellogg and H. Gursky. pp. 315-324.

Discrete Source Models to Explain the Microwave Background Radiation — A. M. Wolfe and G. R. Burbidge. pp. 345-371.

Activity in the Crab Nebula - J. D. Scargle. pp. 401-426.

2-20 keV Spectrum of X-Rays from the Crab Nebula and the Diffuse Background Near Galactic Anticenter — E. A. Boldt; U. D. Desai and S. S. Holt. pp. 427-436.

A Search for Energetic Gamma-Ray Emission from the Supernova Remnant Cassiopeia A — T. C. May and C. J. Waddington. pp. 437-444.

Some Implications of the Anisotropy Measured in the Microwave Background — A. M. Wolfe. pp. 803-813.

Quasi-Stellar Objects and the Density of Intergalactic Hydrogen — P. D. Noerdlinger. pp. 841-846.

Results of Five Nights of Continuous Monitoring of the Optical Flux from Sco X-1 — A. Sandage; J. A. Westphal and J. Kristian. pp. 927-942.

The Interaction of X-Ray Sources with Optically Thin Environments — C. B. Tarter; W. H. Tucker and E. E. Salpeter. pp. 943-951.

The Interaction of X-Ray Sources with Optically Thick Environments — C. B. Tarter and E. E. Salpeter. pp. 953-966.

Spectroscopic Binaries and Collapsed Stars — V. L. Trimble and K. S. Thorne. pp. 1013-1019.

On X-Ray Line Emission from Scorpius XR-1-G. Fritz; J. F. Meekins; R. C. Henry and H. Friedman. pp. L33-L36.

Messier 87: The Galaxy of Greatest Known Mass — J. C. Brandt and R. G. Roosen. pp. L59-L61.

Further Simultaneous Observations of the Optical and X-Ray Spectra of Sco X-1—H. Mark, R. E. Price; R. Rodrigues; F. D. Seward; C. D. Swift and W. A. Hiltner. pp. L67-L72.

Observation of Pulsed Hard X-Radiation from NP 0532 from 1967 Data — G. J. Fishman; F. R. Harnden, Jr. and R. C. Haymes. pp. L107-L110.

Analysis of the Slowing-Down Rate of NP 0532 — H. C. Goldwire, Jr. and F. C. Michel. pp. L111-L114.

Vol. 157: X-Ray Spectra of Several Discrete Cosmic Sources — J. F. Meekins; R. C. Henry; G. Fritz; H. Friedman and E. T. Byram. pp. 197-213.

Observations of X-Rays from Taurus X-1 and Cygnus X-1 — I. S. Glass. pp. 215-222.

Models of X-Ray Stars — O. P. Manley and S. Olbert. pp. 223-246.

X-Ray Spectral Data from GX3+1 — P. Gorenstein; R. Giacconi and H. Gursky. pp. 463-464.

The Cosmic Gamma-Ray Spectrum from Secondary - Particle Production in the Metagalaxy — F. W. Stecker. pp. 507-514.

Cosmic X-Ray Bremsstrahlung Associated with Suprathermal Protons — E. Boldt and P. Serlemitsos. pp. 557-562.

HDE 310376: A Rapid Variable Star Similar to Scorpius XR-1 — R. E. Schild. pp. 709-715.

Pulsar Electrodynamics — P. Goldreich and W. H. Julian. pp. 869-880.

Acceleration of Relativistic Particles in the Crab Nebula — F. C. Michel. pp. 1183-1199.

On the Classification of Emission-Line Spectra of Planetary Nuclei — L. F. Smith and L. H. Aller. pp. 1245-1254.

On the Nature of Pulsars.I. Theory — J. P. Ostriker and J. E. Gunn. pp. 1395-1417.

Observation of Hard Radiation from the Region of the Galactic Center — R. C. Haymes; D. V. Ellis; G. J. Fishman; S. W. Glenn and J. D. Kurfess. pp. 1455-1459.

Interstellar Absorption of 10-A X-Rays — S. Rappaport; H. V. Bradt and W. Mayer. pp. L21-L25.

Far-Infrared Nightsky Emission Above 120 Kilometers — J. R. Houck and M. Harwit. pp. L45-L48.

X-Ray Flux from Centaurus X-2 in the Energy Range 2-20 keV — U. R. Rao; E. V. Chitnis; A. S. Prakasarao and U. B. Jayanthi. pp. L127-L132.

Energy Spectrum and Time Variation of Sco X-1 — U. R. Rao; U. B. Jayanthi and A. S. Prakasarao. pp. L133-L137.

The Recent Appearance of a New X-Ray Source in the Southern Sky — J. P. Conner; W. D. Evans and R. D. Belian. pp. L157-L159.

医乳腺素 医阿尔内氏氏 医皮肤 化二甲基甲基甲基

Vol. 158: Lemaître Universe, Galaxy Formation and Observations — K. Brecher and J. Silk. pp. 91-102.

Heating of HI Regions by Energetic Particles. II.

Integration Between Secondaries and Thermal Electrons —
L. Spitzer, Jr. and E. H. Scott. pp. 161-171.

Thermal Properties of Interstellar Gas Heated by Cosmic Rays — D. W. Goldsmith; H. J. Habing and G. B. Field. pp. 173-183.

Heating of HI Regions by Soft X-Rays — J. Silk and M. W. Werner. pp. 185-192.

Results of Gamma-Ray Balloon Astronomy — C. E. Fichtel, D. A. Kniffen and H. B. Ögelman. pp. 193-206.

High-Energy X-Rays from Cygnus XR-1 — R. G. Bingham and C. D. Clark. pp. 207-218.

Polarization of Thermal X-Ray Sources — J. R. P. Angel. pp. 219-224.

Interstellar L α Absorption in β^1 , δ , and π Scorpii — E. B. Jenkins, D. C. Morton and T. A. Matilsky. pp. 473-478.

Survey of Possible Sources of Cosmic Gamma Rays Above 50 MeV in the Northern Hemisphere — G. M. Frye, Jr. and C. P. Wang. pp. 925-937.

A Blast-Wave Model for the Explosion in the Galaxy M82 — A. B. Solinger. pp. L25-L30.

Sco XR-1 as a Member of the Upper Scorpius Complex — O. J. Eggen. pp. L31-L34.

A New X-Ray Source in the Constellation Ara — A. N. Bunner and T. M. Palmieri. pp. L35-L36.

Measuring the Rate of Nucleosynthesis with a Gamma-Ray Detector — D. D. Clayton and J. Silk. pp. L43-L48.

The Period and Hard X-Ray Spectrum of NP 0532 in 1967 — G. J. Fishman; F. R. Hamden, Jr.; W. N. Johnson III and R. C. Haymes. pp. L61-L64.

Interaction of Cosmic Gamma Rays with Intergalactic Matter — J. Arons and R. McCray. pp. L91-L95.

Identification of S5003 Cen with the New Intense X-Ray Source in Centaurius — 0. J. Eggen and A. W. Rodgers. pp. L111-L112.

Erratum: "Further Simultaneous Observations of the Optical and X-Ray Spectra of Sco X-1" — H. Mark; R. Price; R. Rodrigues; F. Seward; C. Swift and W. Hiltner. p. L131.

Balloon Observations of a New-Born X-Ray Source — R. M. Thomas; G. Buselli; M. C. Clancy and P. J. N. Davison. pp. L151-L154.

Search for Line Structure in the X-Ray Spectrum of Sco X-1—S. S. Holt; E. A. Boldt and P. J. Serlemitsos. pp. L155-L158.

1970

Vol. 159: The Soft X-Ray Spectra of Three Cosmic Sources and Simultaneous Optical Observations of Sco XR-1—
R. J. Grader; R. W. Hill; F. D. Seward and W. A. Hiltner. pp. 201-214.

The Diffuse Cosmic X-Ray Background from 20 to 220 keV — J. A. M. Bleeker and A. J. M. Deerenberg. pp. 215-228.

On the Motion of Current Sheets, and the Radio, Optical, and X-Ray Emission from Pulsars — I. Lerche. pp. 229-237.

The M87 Jet. II. Temperature, Ionization, and X-Radiation in a Secondary-Production Model — J. E. Felten; H. C. Arp and C. R. Lynds. pp. 415-423.

On the Hypothesis that the Coma Cluster is Stabilized by a Massive, Ionized Intergalactic Gas — B. E. Turnrose and H. J. Rood. pp. 773-789.

Low-Energy Gamma Radiation from Cygnus — R. C. Haymes and F. R. Harnden, Jr. pp. 1111-1114.

Supernova Remnants and Hidden Pulsars — A. Cavaliere and F. Pacini. pp. L21-L24.

Radio Sources with Flat Spectra — B. H. Andrew and J. D. Kraus. pp. L45-L49.

Simultaneous X-Ray and Optical Observations of Sco X-1 Flares — H. S. Hudson; L. E. Peterson and D. A. Schwartz. pp. L51-L55.

Observations of the Development and Disappearance of the K-Ray Source Centaurus XR-4 — W. D. Evans; R. D. Belian and J. P. Conner. pp. L57-L60.

New Limits on the Shear and Rotation of the Universe from the X-Ray Background — A. M. Wolfe. pp. L61-L67.

Pulsar NP 0532 and the Ejection of Relativistic Particles into the Crab Nebula — I. S. Shklovsky. pp. L77-L80.

Compact Nonthermal Sources in M87 — G. R. Burbidge. pp. L105-L108.

Upper Limits on the Angular Sizes of Three X-Ray Sources in the Sagittarius Region — G. Polucci; H. V. Bradt; W. Mayer and S. Rappaport. pp. L109-L113.

Positions of X-Ray Sources in the Sagittarius Region — W. Mayer; H. V. Bradt and S. Rappaport. pp. L115-L120.

The Dissolution of Early Clusters of Galaxies by Strong Quasi-Stellar Sources — P. D. Noerdlinger. pp. L179-L183.

Production of the Diffuse Background X-Ray Flux at 44 Å by Suprathermal Proton Bremsstrahlung — R. L. Brown. pp. L187-L192.

Decrease in the High-Energy X-Ray Flux from Centaurus XR-2—W. H. G. Lewin; J. E. McClintock and W. B. Smith. pp. L193-L196.

Vol. 160: X-Ray Characteristics of Three Supernova Remnants —
P. Gorenstein; E. M. Kellogg and H. Gursky. pp. 199-208.

A Measurement of the Optical and X-Ray Emission from Scorpius X-1 and the X-Ray Diffuse Background — A. Toor; F. D. Seward; L. R. Cathey and W. E. Kunkel. pp. 209-213.

Intergalactic Clouds - J. Silk. pp. 793-799.

An X-Ray Survey of the Cassiopeia Region and Its Implications Concerning Supernova Remnants and the Galactic Source Distribution — P. Gorenstein; H. Gursky; E. M. Kellogg and R. Giacconi. pp. 947-957.

On the Motion of Current Sheets, and the Radio, Optical, and X-Ray Emission from Pulsars. II. Pulse Structure, Polarization, Time-Varying Features, and Tight-Beam Emission — I. Lerche. pp. 1003-1017.

Solar X-Ray and Diffuse Cosmic X-Ray Spectra Measured with a Satellite-Borne Instrument — C. Cunningham; D. Groves; R. Price; R. Rodrigues; C. Swift and H. Mark. pp. 1177-1183.

Erratum: "The Soft X-Ray Spectra of Three Cosmic Sources and Simultaneous Observations of Sco X-1"—R. J. Grader; R. W. Hill; F. D. Seward and W. A. Hiltner. p. 1193.

Search for Polarization in the X-Ray Emission of the Crab Nebula — R. S. Wolff; J. R. P. Angel; R. Novick and P. Vanden Bout. pp. L21-L25.

Erratum: "The Period and Hard X-Ray Spectrum of NP 0532 in 1967" — G. J. Fishman; F. R. Harnden, Jr.; W. N. Johnson III and R. C. Haymes. p. L117.

A New Component of Cosmic Gamma Rays Near 1 MeV Observed by the ERS-18 — J. I. Vette; D. Gruber; J. L. Matteson and L. E. Peterson. pp. L161-L170.

Radial Velocities of the X-Ray Candidate Star S5003 Centauri — M. W. Feast. pp. L171-L172.

Vol. 161: The Rate of Mass Exchange in DQ Herculis — S. G. Starrfield. pp. 361-363.

Erratum: "Cosmic X-Ray Bremsstrahlung Associated with Suprathermal Protons" — E. Boldt and P. Serlemitsos. p. 375.

Radiative Ionization of the Filaments in the Crab Nebula — K. Davison and W. Tucker. pp. 437-449.

Addendum: "Acceleration of Relativistic Particles in the Crab Nebula" — F. C. Michel. p. 801.

Heating of HI Regions by Soft X-Rays. II. The Effect of Galactic Soft X-Ray Sources — M. W. Werner; J. Silk and M. J. Rees. pp. 965-977.

Observation of Galactic X-Ray Sources 1968 November 3 — A. MacGregor; F. Seward and I. Turiel. pp. 979-986.

Scorpius XR-1: Some X-Ray and Optical Observations (1969 May) — G. A. Burginyon; R. J. Grader; R. W. Hill; R. E. Price; R. Rodrigues; F. D. Seward; C. D. Swift; W. A. Hiltner and E. J. Mannery. pp. 987-995.

The X-Ray Emission from Supernova Outbursts and the Diffuse X-Ray Background — W. H. Tucker. pp. 1161-1163.

Detection of X-Ray Emission from 3C 273 and NGC 5128 — C. S. Bowyer; M. Lampton; J. Mack and F. De Mendonca. pp. L1-L7.

Forbidden-Line Emission from Hot HI Regions - J. Silk. pp. L37-L40.

Soft X-Rays from the Cygnus Loop — R. J. Grader; R. W. Hill and J. P. Stoering. pp. L45-L50.

Collective Modes of Plasma Surrounding a Collapsed Star — B. Coppi and A. Ferrari. pp. L65-L69.

Erratum: "Balloon Observations of a New-Born X-Ray Source"—R. M. Thomas; G. Buselli; M. C. Clancy and P. J. N. Davison. p. L155.

Precise Location of Sagittarius X-Ray Sources with a Rocket-Borne Rotating Modulation Collimator — H. W. Schnopper; H. V. Bradt; S. Rappaport; E. Boughan; B. Burnett; R. Doxsey; W. Mayor and S. Watt. pp. L161-L167.

An Optical Search for the X-Ray Sources GX3+1, GX5-1, GX9+1, and GX17+2 - W. Kunkel; P. Osmer; M. Smith; A. Hoag; D. Schroeder; W. A. Hiltner; H. Bradt; S. Rappaport and H. W. Schnopper. pp. L169-L172.

A Search for Radio Emission from Four X-Ray Sources
Near Sagittarius — B. H. Andrew; C. R. Purton;
S. Rappaport; H. Bradt and H. W. Schnopper. pp. L173-L174.

X-Ray Line Emission from Scorpius X-1 — L. W. Acton; R. C. Catura; J. L. Culhane and P. C. Fisher. pp. L175-L179.

Vol. 162: Spallation Limits on Interstellar Fluxes of Low-Energy Cosmic Rays and Nuclear Gamma Rays — W. A. Fowler; H. Reeves and J. Silk. pp. 49-56.

On the Motion of Current Sheets, and the Radio, Optical, and X-Ray Emission from Pulsars. III. The Independent-Particle Picture and Radiation—I. Lerche. pp. 153-160.

A Search for Rapid Optical Oscillations in Scorpius XR-1 — M. Lampton; C. S. Bowyer and S. Harrington. pp. 181-186.

Flare Stars as X-Ray Sources - J. E. Grindlay. pp. 187-198.

Were the Lightest Stable Isotopes Produced by Photodissociation? — R. L. Macklin. pp. 353-355.

The Spectrum of Diffuse Cosmic X-Rays: 7.7 - 113 keV — D. A. Schwartz; H. S. Hudson and L. E. Peterson. pp. 431-437.

The Isotropy of the Diffuse Cosmic X-Rays Determined by OSO-III — D. A. Schwartz. pp. 439-444.

The Rotation and Angular Momentum of Galaxies — C. Hunter. pp. 445-452.

Optical Polarization and Intensity of the Pulsar in the Crab Nebula — J. Kristian; N. Visvanathan; J. A. Westphal and G. H. Snellen. pp. 475-483.

Radio Pulse Shapes, Flux Densities, and Dispersion of Pulsar NP 0532 — J. M. Rankin; J. M. Comella; H. D. Craft, Jr.; D. W. Richards; D. B. Campbell and C. C. Counselman III. pp. 707-725.

Extragalactic Pulsars — J. N. Bahcall; M. J. Rees and E. E. Salpeter. pp. 737-742.

Balloon-Borne Studies of X-Ray Emission from Selected Regions in the Northern Sky — W. R. Webber and C. P. Reinert. pp. 883-889.

Radio Recombination Lines from Diffuse Interstellar Gas — S. T. Gottesman and M. A. Gordon. pp. L93-L97.

Continual Variations in the High-Energy Flux of X-Rays from Scorpius X-1 — W. H. G. Lewin; J. E. McClintock; S. G. Ryckman; I. S. Glass and W. B. Smith. pp. L109-L113.

X-Ray and Optical Variations of Scorpius X-1 — W. D. Evans; R. D. Belian; J. P. Conner; I. B. Strong; W. A. Hiltner and W. E. Kunkel. pp. L115-L119.

A Model for the Radiations from the Compact Strong Sources—A. Cavaliere; P. Morrison and F. Pacini. pp. L133-L138.

Low-Energy Gamma Rays from NP 0532 — R. R. Hillier; W. R. Jackson, A. Murray; R. M. Redfern and R. G. Sale. pp. L177-L180.

1971

Vol. 163: On the Ultraviolet Absorption-Line Spectra Produced by HI Regions — J. Silk and R. L. Brown. pp. 495-502.

Theory of Radiation Mechanisms of Pulsars. I.— H. Y. Chiu and V. Canuto. pp. 577-594.

Results of a Search for Optical Pulsars — P. Horowitz; C. Papaliolios and N. P. Carleton. pp. L5-L10.

The Secular Decrease of the Optical and X-Ray Luminosity of Pulsars — F. Pacini. pp. L17-L19.

Observations of the Crab Pulsar at 410 and 1664 MHz - R. N. Manchester. pp. L61-L63.

Spectroscopic Observations of Scorpius X-1 — D. Mook; W. A. Hiltner and R. Lynds. pp. L69-L71.

Excess Background Radiation of Soft X-Rays at the Galactic Pole and Plane — R. C. Henry; G. Fritz; J. F. Meekins; T. Chubb and H. Friedman. pp. L73-L77.

Vol. 164: Soft X-Rays from Two Supernova Remnants — T. M. Palmieri; G. Burginyon; R. J. Grader; R. W. Hill; F. D. Seward and J. P. Stoering. pp. 61-66.

The Sky Near the Brightest X-Ray Source in Scorpius. III — H. M. Johnson. pp. 67-76.

Models for the Stabilization of Clusters of Galaxies by Hot Gas Consistent with Observations of PKS 1116+12 — P. D. Noerdlinger. pp. 217-221.

Low-Energy Cosmic X-Rays — P. G. Shukla and B. G. Wilson. pp. 265-273.

 $H\beta$ Photometry of the Night Sky — H. M. Johnson. pp. 379-382.

On the Photoionization of Hydrogen and Helium -R. L. Brown. pp. 387-388.

Radiative Transfer of Isotropic X-Rays and Gamma Rays. I. General Theory and Solutions for a Uniform Medium — J. Arons. pp. 437-455.

Radiative Transfer of Isotropic X-Rays and Gamma Rays. II. High Energy Radiation in the Expanding Universe — J. Arons. pp. 457-468.

A Model of Pulsars - P. A. Sturrock. pp. 529-556.

The Radio Sources Associated with Scorpius X-1 - R. M. Hjellming and C. M. Wade. pp. L1-L7.

Search for Temporal Structure in X-Rays from Scorpius X-1 — E. A. Boldt; S. S. Holt and P. J. Serlemitsos. pp. L9-L13.

The X-Ray Spectra of the Crab Nebula and NP 0532—G. Fritz; J. F. Meekins; T. A. Chubb and H. Friedman. pp. L55-L60.

Simultaneous Radio and Optical Measurements of Scorpius XR-1 — M. Lampton; S. Bowyer; J. Welch and G. Grasdalen. pp. L61-L65.

Discovery of an X-Ray Source in Perseus — G. Fritz; A. Davidsen; J. F. Meekins and H. Friedman. pp. L81-L85.

X-Ray Spectrum of Scorpius X-1 Obtained with a Bragg Crystal Spectrometer — H. Kestenbaum; J. R. P. Angel and R. Novick. pp. L87-L93.

Vol. 165: Galactic Wakes — M. A. Ruderman and E. A. Spiegel. pp. 1-15.

An X-Ray Scan of the Galactic Plane from Uhuru—R. Giacconi; E. Kellogg; P. Gorenstein; H. Gursky and H. Tananbaum. pp. L27-L35.

Measurement of the Location of the X-Ray Sources Cygnus X-1 and Cygnus X-2 from Uhuru — H. Tananbaum; E. Kellogg; H. Gursky; S. Murray; E. Schreier and R. Giacconi. pp. L37-L41.

Detection of X-Rays from the Seyfert Galaxies NGC 1275 and NGC 4151 by the Uhuru Satellite — H. Gursky; E. M. Kellogg; C. Leong; H. Tananbaum and R. Giacconi. pp. L43-L48.

X-Ray Observations of the Virgo Cluster, NGC 5128, and 3C 273 from the Uhuru Satellite — E. Kellogg; H. Gursky; C. Leong; E. Schreier; H. Tananbaum and R. Giacconi. pp. L49-L54.

Vol. 166: Radiative Transfer in an Ionized Medium at High Temperature — E. D. Loh and G. P. Garmire. pp. 301-309.

Heating of the Interstellar Medium by X-Rays and by Cosmic Rays — H. J. Habing and D. W. Goldsmith. pp. 525-541.

X-Ray Pulsations from Cygnus X-1 Observed from Uhuru — M. Oda; P. Gorenstein; H. Gursky; E. Kellogg; E. Schreier; H. Tananbaum and R. Giacconi. pp. L1-L7.

Line Emission in the X-Ray Background — S. Shulman; G. Fritz; J. F. Meekins; T. A. Chubb; H. Friedman and R. C. Henry. pp. L9-L12.

The Signature of a Pulsar on the Diffuse X-Ray Background — J. Silk. pp. L39-L44.

Evidence for Multiple Periodicity in the X-Ray Emission from Cygnus X-1 — S. S. Holt; E. A. Boldt; D. A. Schwartz; P. J. Serlemitsos and R. D. Bleach. pp. L65-L68.

Detection of a High-Energy X-Ray Flare from a Source in Crux — W. H. G. Lewin; J. E. McClintock; S. G. Ryckman and W. B. Smith. pp. L69-L72.

Rapid Fluctuations in the High-Energy X-Ray Flux from a Source in Crux — J. E. McClintock; G. R. Ricker and W. H. G. Lewin. pp. L73-L76.

Vol. 167: Radiation Transfer of Radio Recombination Lines in the Diffuse Interstellar Medium — M. A. Gordon. pp. 21-25.

Search for 3.5 - Millimeter Continuum Radiation from Infrared Stars and Related Objects — R. W. Hobbs and P. Marionni. pp. 85-87.

Radiative Cooling of a Low-Density Plasma - D. P. Cox and E. Daltabuit. pp. 113-117.

Weak X-Ray Sources in the Southern Hemisphere — P. J. N. Davison; G. Buselli; M. C. Clancy and R. M. Thomas. pp. 479-486.

The Dynamics of Extended Extragalactic Radio Sources — D. S. De Young. pp. 541-551.

A Limit on Line Emission in the X-Ray Background at High Galactic Latitudes — E. A. Boldt; U. D. Desai; S. S. Holt and P. J. Serlemitsos. pp. L1-L2.

Low-Energy Diffuse X-Rays — A. N. Bunner; P. L. Coleman; W. L. Kraushaar and D. McCammon. pp. L3-L8.

Plasma Model for Thermal X-Ray Sources — B. Coppi and A. Treeves. pp. L9-L13.

The Estimated Distance to Cygnus X-1 Based on Its Low-Energy X-Ray Spectrum — H. Gursky; P. Gorenstein; F. J. Keer and E. J. Grayzeck. pp. L15-L21.

Discovery of Periodic X-Ray Pulsations in Centaurus X-3 from Uhuru — R. Giacconi; H. Gursky; E. Kellogg; E. Schreier and H. Tananbaum. pp. L67-L73.

A Strong X-Ray Source in the Coma Cluster Observed by Uhuru — H. Gursky; E. Kellogg; S. Murray; C. Leong; H. Tananbaum and R. Giacconi. pp. L81-L84.

A Blast-Wave Model for the Vela X Supernova Remnant and the Origin of the Gum Nebula — W. H. Tucker. pp. L85-L87.

Vol. 168: Detection of Radio Recombination-Line Emission Associated with Distributed Ionized Hydrogen — P. D. Jackson and F. J. Keer. pp. 29-35.

A Cocoon Pulsar Model for Scorpius X-1-K. Davidson; F. Pacini and E. E. Salpeter. pp. 45-55.

Fossil Strömgren Spheres from Supernova Explosions — M. C. Kafatos and P. Morrison. pp. 195-201.

Erratum: "Low-Energy Cosmic X-Rays" — P. G. Shukla and B. G. Wilson. p. 319.

Electron Density and Temperature in the Diffuse Interstellar Medium Determined from Recombination Lines — M. A. Gordon and S. T. Gottesman. pp. 361-371.

Ionization Equilibrium of Interstellar Nitrogen:
A Probe for the Intercloud Medium? — G. Steigman;
M. W. Werner and F. M. Geldon. pp. 373-380.

Erratum: "Results of Gamma-Ray Balloon Astronomy" — C. E. Fichtel; D. A. Kniffen and H. B. Ögelman. p. 581.

X-Ray Observations of Virgo XR-1 — M. Lampton; S. Bowyer; J. E. Mack and B. Margon. pp. L1-L6.

X-Rays from the Magellanic Clouds — R. E. Price; D. J. Groves; R. M. Rodrigues; F. D. Seward; C. D. Swift and A. Toor. pp. L7-L9.

Measurement of the Location of the X-Ray Source Cygnus X-1 — S. Miyamoto; M. Fujii; M. Matsuoka; J. Nishimura; M. Oda; Y. Ogawara; S. Ohta and M. Wada. pp. L11-L14.

X-Ray Source Positions for Cygnus X-1, Cygnus X-2, and Cygnus X-3 — A. Toor; R. Price; F. Seward and J. Scudder. pp. L15-L16.

On the Location of Cygnus X-1 — S. Rappaport; W. Zaumen and R. Doxsey. pp. L17-L20.

Radio Emission from X-Ray Sources — R. M. Hjellming and C. M. Wade. pp. L21-L24.

X-Ray Observations of GX 17+2 from Uhuru — H. Tananbaum; H. Gursky; E. Kellogg and R. Giacconi. pp. L25-L28.

A Search for Absorption of the Soft X-Ray Diffuse Flux by the Small Magellanic Cloud — D. McCammon; A. N. Bunner; P. L. Coleman and W. L. Kraushaar. pp. L33-L37.

Observation of Low-Energy Gamma Radiation from NP 0532 — J. D. Kurfess. pp. L39-L42.

A Search for X-Ray Pulsations from Cygnus X-1—S. Rappaport; R. Doxsey and W. Zaumen. pp. L43-L47.

X-Ray Intensity Fluctuations in Cygnus XR-1 — S. Shulman; G. Fritz; J. F. Meekins; H. Friedman and M. Meidav. pp. L49-L51.

On the Optical Identification of Cygnus X-1 — J. Kristian; R. Brucato; N. Visvanathan; H. Lanning and A. Sandage. pp. L91-L93.

A Search for an Optical Source at the Position of Centaurus XR-3 — J. L. Elliot; P. Horowitz; W. Liller; C. Papaliolios and J. Veverka. pp. L95-L96.

Vol. 169: Diffuse Cosmic X-Ray Flux from 0.2 to 2 keV — T. M. Palmieri; G. A. Burginyon; R. J. Grader; R. W. Hill; F. D. Seward and J. P. Stoering. pp. 33-39.

Ionization and Heating of the Gum Nebula by Energetic Particles from the Vela X Supernova — R. Ramaty; E. A. Boldt; S. A. Colgate and J. Silk. pp 87-96.

Suprathermal Proton Bremsstrahlung by the Weizsäcker - Williams Method — F. C. Jones. pp. 503-506.

X-Rays from Puppis A and the Vicinity of Vela X — F. D. Seward; G. A. Burginyon; R. J. Grader; R. W. Hill; T. M. Palmieri and J. P. Stoering. pp. 515-524.

A Possible Interpretation of the Precursor Pulse in NP 0532 — F. Pacini. pp. L11-L12.

The Coma Cluster as an X-Ray Source: Some Cosmological Implications — J. R. Gott III and J. E. Gunn. pp. L13-L15.

X-Rays from a New Variable Source GX 1+4 - W. H. G. Lewin; G. R. Rickerand J. E. McClintock. pp. L17-L21.

A Pulsing X-Ray Source in Circinus — B. Margon; M. Lampton; S. Bowyer and R. Cruddace. pp. L23-L25.

Evidence for a Highly Compact X-Ray Source — B. Margon; S. Bowyer; M. Lampton and R. Cruddace. pp. 145-148.

Correlated Transient Short-Period Oscillation in the Optical and X-Ray Flux from Scorpius X-1 — H. Kestenbaum; J. R. P. Angel; R. Novick and W. J. Cocke. pp. L49-L55.

Evidence of High-Frequency Oscillations in the X-Ray Flux from Scorpius X-1 — J. R. P. Angel; H. Kestenbaum and R. Novick. pp. L57-L61.

GX 349 + 2 and GX 340 + 0: Locations and X-Ray Pulsation Limits — S. Rappaport; W. Zaumen; R. Doxsey and W. Mayer. pp. L93-L97.

X-Ray Sources Near the Galactic Center Observed by Uhuru — E. Kellogg; H. Gursky; S. Murray; H. Tananbaum and R. Giacconi. pp. L99-L103.

On the Absorption of Gamma Rays by Photons in Pulsars, Quasi-Stellar Objects, and Other Source Objects — J. B. Pollack; P. D. Guthrie and B. S. P. Shen. pp. L113-L116.

Vol. 170: On the Possibility of Pulsar Action in Quasars — P. A. Sturrock. pp. 85-92.

On Quasar Evolution — A. Cavaliere; P. Morrison and K. Wood. pp. 223-231.

Interstellar Gas in the Direction of the Vela Pulsar — G. Wallerstein and J. Silk. pp. 289-296.

Interaction of Fast Particles with Intergalactic Matter — J. Arons; R. McCray and J. Silk. pp. 431-447.

Further Radio Observations of Scorpius X-1 — C. M. Wade and R. M. Hjellming. pp. 523-528.

A Model of Epsilon Aurigae — R. E. Wilson. pp. 529-539.

Identification of the Nucleus of NGC 5128 —W. E. Kunkel and H. V. Bradt. pp. L7-L10.

Radio Emission from the Nucleus of NGC 5128 — C. M. Wade; R. M. Hjellming; K. I. Kellermann and J. F. C. Wardle. pp. L11-L13.

Infrared Observations of the Core of Centaurus A, NGC 5128 — E. E. Becklin; J. A. Frogel; D. E. Kleinmann; G. Neugebauer; E. P. Ney and D. W. Strecker. pp. L15-L19.

Further Observations of the Pulsating X-Ray Source Cygnus X-1 from Uhuru — E. Schreier; H. Gursky; E. Kellogg; H. Tananbaum and R. Giacconi. pp. L21-L27.

X-Ray Observation of a New Soft Source in Cygnus — P. L. Coleman; A. N. Bunner; W. L. Kraushaar and D. McCammon. pp. L47-L49.

On the Circular Polarization of Some Peculiar Objects — N. S. Nikulin; V. M. Kuvshinov and A. B. Severny. pp. L53-L58.

X-Ray Emission from the Magellanic Clouds Observed by Uhuru — C. Leong; E. Kellogg; H. Gursky; H. Tananbaum and R. Giacconi. pp. L67-L71.

Radio Observations of Magnetic White Dwarfs — V. A. Hughes; P. A. Feldman and A. Woodsworth. pp. L125-L126.

1972

Vol. 171: Photochemistry and Lifetimes of Interstellar Molecules —
L. J. Stief; B. Donn; S. Glicker; E. P. Gentieu and
J. E. Mentall. pp. 21-30.

Gamma-Ray Observations of the Galactic Center and Some Possible Point Sources — C. E. Fichtel; R. C. Hartman; D. A. Kniffen and M. Sommer. pp. 31-40.

X-Ray Spectra of Discrete Sources in Cygnus — R. D. Bleach, E. A. Boldt, S. S. Holt, D. A. Schwartz and P. J. Serlemitsos. pp. 51-54.

Cosmic-Ray Effects on Diffuse Gamma-Ray Measurements—G. J. Fishman. pp. 163-167.

Metagalactic Gamma Rays from Relativistic-Electron Bremsstrahlung Interactions — F. W. Stecker and D. L. Morgan, Jr. pp. 201-207.

Photoionization and the Emission-Line Spectra of Quasi-Stellar Objects — K. Davidson. pp. 213-231.

On the Time Dependence of Emission-Line Strengths from a Photoionized Nebula — J. N. Bahcall; B. Kozlovsky and E. E. Salpeter. pp. 467-482.

A Soft X-Ray Survey from the Galactic Center to Vela — R. W. Hill; G. Burginyon; R. J. Grader; T. M. Palmieri; F. D. Seward and J. P. Stoering. pp. 519-528.

Possible Observation of High-Energy Gamma Rays from the Cygnus Region — M. Niel; G. Vedrenne and R. Bouigue. pp. 529-536.

The X-Ray Spectrum of NGC 5128 — M. Lampton; B. Margon; S. Bowyer; W. Mahoney and K. Anderson. pp. L45-L50.

Low-Energy X-Rays Ruled Out as Interstellar Ionizing Mechanism Toward K3-50 — E. J. Chaisson and L. E. Goad. pp. L61-L65.

A Probable Precursor to the X-Ray Nova Centaurus XR-4 -- R. D. Belian; J. P. Conner and W. D. Evans. pp. L87-L90.

Vol. 172: Radial Pulsations of Pre-White-Dwarf Stars. I. Linear Quasi-Adiabatic Analysis — H. M. Van Horn; M. B. Richardson and C. J. Hansen. pp. 181-199.

Ratio of Line Intensities in Helium-Like Ions as a Density Indicator — G. R. Blumenthal; G. W. F. Drake and W. H. Tucker. pp. 205-212.

Limitations on Thermal and Nonthermal Models for the Radiation from Extragalactic Sources — T. W. Jones and P. J. Kellogg. pp. 283-298.

The Optical Polarization of Scorpius X-1 — J. D. Landstreet and J. R. P. Angel. pp. 443-446.

Low-Mass Protogalaxies and Absorption Lines in Quasi-Stellar Objects — J. Arons. pp. 553-562.

Intergalactic Clouds in the Coma Cluster? — D. Goldsmith and J. Silk. pp. 563-575.

The Recombination Spectrum of the Planetary Nebula NGC 7027 — J. S. Miller and W. G. Mathews. pp. 593-607.

Dissipative Processes in Neutron-Star Crusts and the Production of Blackbody X-Ray Sources — R. N. Henriksen; P. A. Feldman and W. Y. Chau. pp. 717-728.

The Spectrum of Low-Energy Gamma Radiation from the Galactic-Center Region — W. N. Johnson III; F. R. Harnden, Jr. and R. C. Haymes. pp. L1-L7.

On the Nature of the Monoceros Supernova Remnant — W. L. Gebel and S. N. Shore. pp. L9-L12.

Dynamic Spectrum Analysis of Cygnus X-1 — M. Oda; M. Wada; M. Matsuoka; S. Miyamoto; N. Muranaka' and Y. Ogawara. pp. L13-L16.

Search for Pulsed Radio Emission from Scorpius X-1 and Cygnus X-1 — J. H. Taylor; G. R. Huguenin and R. M. Hirsch. pp. L17-L19.

Upper Limits to the Soft X-Ray Emission of Sources in Virgo — P. Gorenstein; B. Harris and H. Gursky. pp. L41-L45.

The Low-Energy Gamma-Ray Spectrum of Scorpius X-1—R. C. Haymes; F. R. Harnden, Jr.; W. N. Johnson III; H. M. Prichard and H. E. Bosch. pp. L47-L49.

Soft X-Rays from the Vicinity of the North Polar Spur — A. N. Bunner; P. L. Coleman; W. L. Kraushaar and D. McCammon. pp. L67-L72.

Limit on Line Emission in the Diffuse X-Ray Background — A. Toor; R. E. Price and F. D. Seward. pp. L73-L75.

Evidence for the Binary Nature of Centaurus X-3 from Uhuru X-Ray Observations — E. Schreier; R. Levinson; H. Gursky; E. Kellogg; H. Tananbaum and R. Giacconi. pp. L79-L89.

Evidence for Hard X-Ray Pulsations from the Vela Pulsar — F. R. Harnden, Jr.; W. N. Johnson III and R. C. Haymes. pp. L91-L94.

Pp. L91-L94.

Absence of Lyman-Alpha Emission from the Coma Cluster of Galaxies — R. C. Henry. pp. L97-L100.

Later and the second of the second

APPROVAL

A COSMIC X-RAY ASTRONOMY BIBLIOGRAPHY: THE ASTROPHYSICAL JOURNAL, 1962 to 1972

By Robert M. Wilson

The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has also been reviewed and approved for technical accuracy.

WILLIAM C. SNODDY

M. Halusermann

Chief, Space Thermophysics Division

W. Haeussermann

Acting Director, Space Sciences Laboratory

DISTRIBUTION

INTERNAL

AD-S

Dr. E. Stuhlinger

Dr. G. Bucher

PD-AP

Mr. J. Downey.

PD-MP

Mr. H. Gierow

Mr. J. Oliver

Mr. P. Schwindt

Mr. S. Larson

Mr. R. Potter

SS-H-MGR

Dr. F. Speer

SS-H-X

Mr. C. Dailey

Mr. J. Jones

Mr. J. Cochran

Mr. E. Stulka

Mr. L. Berry

S &E-ASTR-RP

Dr. J. Randall

Mr. R. Hoover

S &E-ASTR-SI

Mr. J. Caudle

Mr. A. Davis

S&E-SSL-DIR

Dr. W. Haeussermann

Mr. R. Hembree

S&E-SSL-X

Dr. J. Dozier

Mr. C. Winkler

Mr. H. Weathers

S&E-SSL-N

Dr. R. Decher

Mr. H. Stern

Dr. T. Parnell

Dr. A. de Loach

经控制等 计自由操作工作系统 含漢字法學的

Dr. E. Urban

S&E-SSL-P

Dr. R. Naumann

Mr. J. McGuire

S&E-SSL-S

Dr. W. Sieber

Mr. B. Blake

S&E-SSL-T

Mr. W. Snoddy

Dr. K. Schocken

Mr. J. Milligan

Mr. B. Jones

Mr. G. Arnett

Mr. E. Miller

Mr. S. Fields

Mr. J. Reynolds

Mr. H. Atkins

Mr. W. Fountain

Mr. J. Fountain

Mr. C. Baugher

Mr. B. Duncan

Mr. E. Reichmann Dr. T. Wdowiak

Mr. J. Michlovic

Mr. R. Wilson (50)

S&E-SSL-C

Reserve (10)

A&PS-MS-IP (2)

A&PS-MS-IL (8)

A&PS-TU (6)

A&PS-MS-H

EXTERNAL

Department of Astronomy

University of South Florida

Tampa, Florida 33620

Attn: Dr. H. K. Eichhorn von Wurmb

Dr. S. Sofia

Dr. R. Wilson

Dr. E. Devinney

External (Concluded)

Department of Physics and Astronomy

Vanderbilt University

Nashville, Tennessee 37203

Attn: Dr. D. Hall

The Aerospace Corp.

P.O. Box 95085

Los Angeles, California 90009

Attn: Dr. A. B. C. Walker, Jr.

Dr. J. Underwood

NASA, Goddard Space Flight Center

Greenbelt, Maryland 20771

Attn: Dr. E. Boldt

Dr. S. Holt

Dr. P. Serlemitsos

Teledyne Brown Engineering

Research Park

Huntsville, Alabama 35807

Attn: Dr. G. Fishman

Scientific and Technical Information Facility (25)

P.O. Box 33

College Park, Maryland 20740

Hayes International

C. W. Core